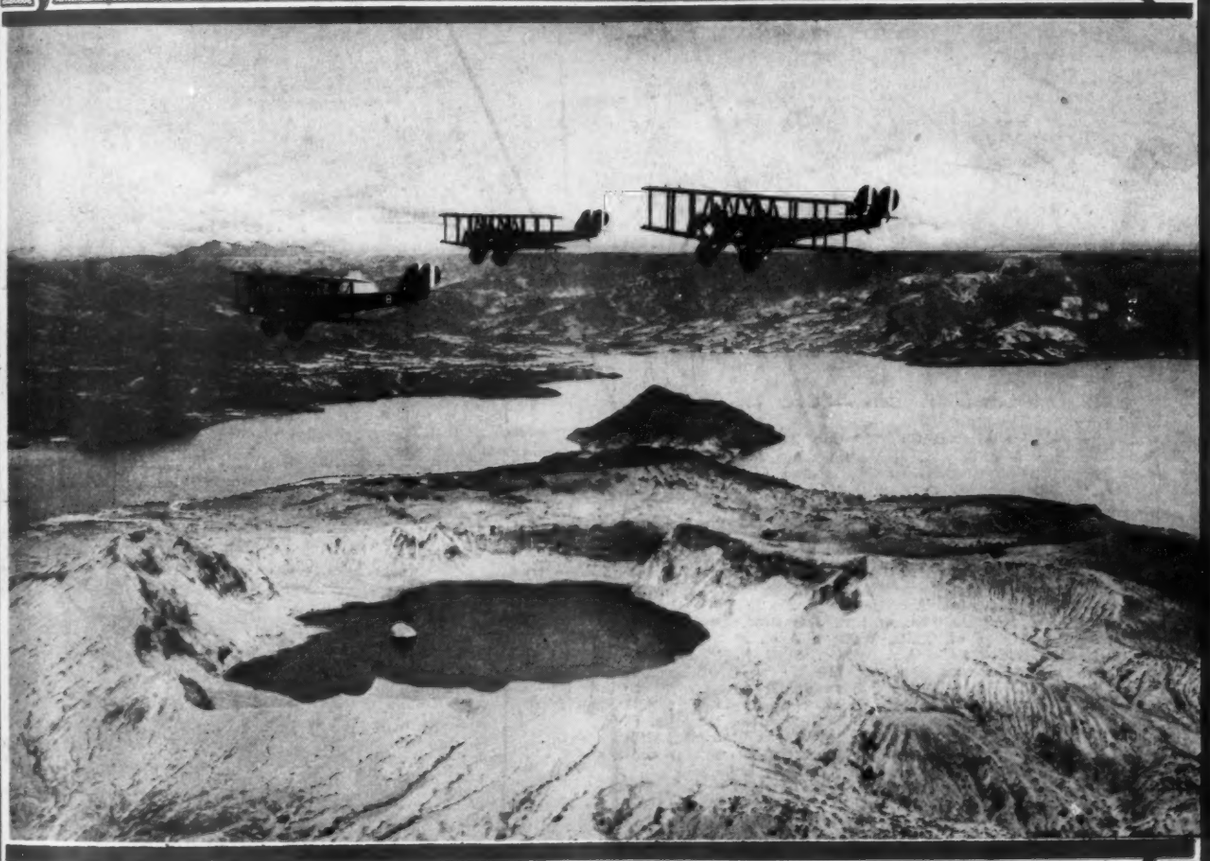
TECHNICAL DEPT.

AVIATION

The Oldest American Aeronautical Magazine

APRIL 30, 1928 | Issued Weekly | PRICE 20 CENTS



Army bombers over the crater of the Taal volcano in Hawaii

VOLUME XXIV

NUMBER 18

Special Features

The Halpin "Flamingo"
A Designer's Impressions of the Detroit Show
The All-American Aircraft Show in Retrospect

AVIATION PUBLISHING CORPORATION
250 WEST 57 STREET, NEW YORK

Publication Office, Highland, N. Y. Entered as Second-Class Matter, Nov. 22, 1920, at the Post Office at Highland, N. Y. under Act of March 3, 1879.

TOLEDO PUBLIC LIBRARY

ALEXANDER HAS THE LARGEST SALES FORCE — WHY?

39 Eaglerock Distributors — Over 100 Dealers

Alabama—Major Aircraft Co., 712 Candler Bldg., Atlanta, Ga.
Florida—Raymond Aircraft Co., Haldeman-Elder Airport, Lakeland, Fla.
Kentucky—Datin Eaglerock Sales Co., Iseman Airport, Paducah, Ky.
N. C. & Va.—Charles Flying Service, Box 44, North Side, Richmond, Va.
Northern Iowa—Pioneer Flyers, Inc., Mason City, Iowa
Indiana—Ray Kuhl, Y. M. C. A., South Bend, Ind.
Michigan—Kysor Eaglerock Company, Niles, Michigan
East N. Y., N. J. and Conn.—Atlantic Airways, 55 W. 16th, New York, N. Y.
Wisconsin—Hall Aircraft Co., 101 Scott St., Wausau, Wisconsin
W. Mo. & E. Kan.—Bennett Eaglerock Sales Co., 223 W. 12th St., K. C., Mo.
Okla. & Tex. Pan.—Southwest Airways Corp., Route 5, Oklahoma City
Southern Texas—Marion P. Hair, 430 E. Josephine, San Antonio, Texas
S. Cal. & Ariz.—Aero Corp. of Calif., Western Ave., at 99th St., Los Angeles
Northern Calif.—Golden State Aircraft Co., 2291 E. 12th St., Oakland
W. Wash.—Olympic Aeronautical Corp., 710 Wash. Bldg., Tacoma, Wash.
Wyo., Mont. & W. Neb.—Wyoming Airways, Inc., Casper, Wyoming
S. Dak. & N. Dak.—Rapid Air Lines, Inc., Rapid City, S. D.
W. Va. and E. Ohio—Lyle H. Scott, 328 2nd St., Marietta, Ohio
W. Kan. & E. Neb.—Steele Airlines, Inc., 717 Union State Bk. Bldg., Omaha
La.—Louisiana Airways, 1711 Pere Marquette Bldg., New Orleans
Utah—Rocky Mountain Airways, Salt Lake City
Tenn. & Ark.—Tri-States Airways, Bry Block, Memphis, Tenn.
Maryland & E. Pennsylvania—Mount Vernon Airways, Inc., Alexandria, Va.
Georgia and So. Carolina—Errett Williams, Spartanburg, S. C.
Me., N. H., Vt., R. I. and Mass.—Massachusetts Airways Corp., 1597 Main St., Springfield, Mass.
West Penn. and N. E. Ohio—Morris Flying Service, 1100 Wisconsin Avenue, Dormont—Pittsburgh, Pa.
N. E. Ind. & W. Ohio—Ind.-O. Aero Corp., 203 Carroll Bldg., Ft. Wayne, Ind.
No. Illinois—Jack Oates, Inc., 5101 W. Madison, Chicago
E. Wash. & N. Idaho—Inland Eaglerock Aircraft Co., 1304 E. Trent, Spokane, Washington
Minn.—Minnesota Aircraft Co., 406-6th Ave., Minneapolis
Miss.—Mississippi Airways, Jackson, Miss.
So. Ill. and E. Mo.—Von Hoffmann Aircraft Co., 105 So. 9th, St. Louis
B. C.—British Columbia Airways, Ltd., 900 Fort St., Victoria
Southern Iowa—Roy B. Dodson, Kirksville, Mo.
Alaska—Meals Eaglerock Sales, Valdez
West N. Y.—Becker Flying Service, Inc., 250 Franklin St., Buffalo
Oregon—Oregon Eaglerock Sales Co., 577 Pittock Block, Portland, Oregon
N. Tex.—Wichita Falls Air Transport Co., Inc., 1202 Staley Bldg., Wichita Falls
Nevada—Donald J. Hanson, Reno

ALEXANDER AIRCRAFT CO.

Room 401, Alexander Industries Bldg., Denver, Colo.

PROVE

TO ME THAT I SHOULD BUY AN

EAGLEROCK

AND I'LL HAND YOU MY CHECK

That's what every prospect means, whether he says so in that many words, or not.

That's all we want — the opportunity to prove to you the Eaglerock's superiority in —

Appearance, Construction Details, Strength, Performance, Dollar for Dollar Value, Service, Economy, Customer Satisfaction.

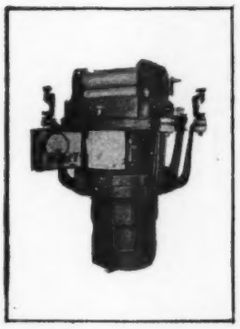
The Eaglerock with detachable motor mount has greater ruggedness than ever before to take care of all new production motors up to 260 h.p.

PRICE OF SHIP WITHOUT MOTOR OR PROP. $2250. ON DENVER FIELD

MOTOR PRICES—

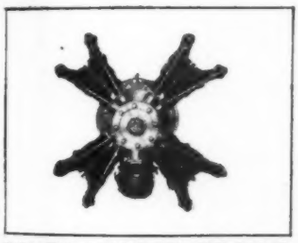
Menasco, 260 hp. .....$2750.
Whirlwind J5, 220 hp. ....$4980.
Ryan-Siemens, 120 hp. ....$2970.

ALEXANDER EAGLEROCK



FAIRCHILD AERIAL CAMERA CORPORATION, pioneers and largest manufacturers of aerial cameras.

FAIRCHILD AERIAL SURVEYS, Inc., contractors for aerial maps and oblique pictures; branches, Dallas and Los Angeles.



FAIRCHILD-CAMINEZ ENGINE CORPORATION, manufacturers of advanced types of air-cooled engines.

FAIRCHILD AIRPLANE MFG. CORPORATION, manufacturers of folding-wing cabin monoplanes and metal floats.

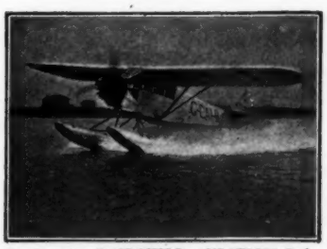
THE FAIRCHILD AVIATION CORPORATION was formed for the purpose of organizing, financing and managing a group of subsidiaries in both the manufacturing and operating fields of aeronautics.

Today there are eight subsidiaries, each a distinct and complete organization in itself, but at the same time profiting from the centralized management and guidance of the parent company and the friendly co-operation from all of the other subsidiaries.

For nearly eight years the name Fairchild has been synonymous with the utmost in accuracy and reliability of aerial products. It is, therefore, only natural that the Fairchild Aviation Corporation will endeavor to maintain its enviable position of leadership in the field of quality aviation products.

FAIRCHILD AVIATION CORPORATION
270 West 38th Street - - New York

FAIRCHILD FLYING CORPORATION, operators of airplanes for photographic and aerial taxi work.



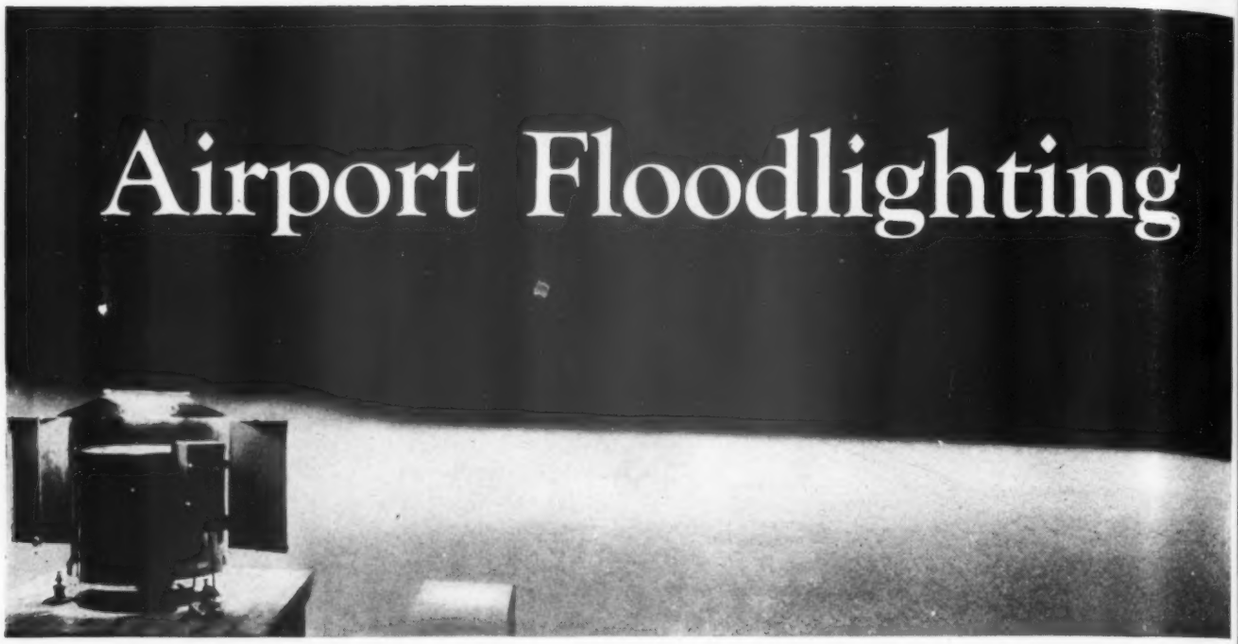
In Canada: FAIRCHILD AVIATION, Ltd., aerial surveying for large timber interests and air transport work.

In Mexico: COMPANIA MEXICANA DE AVIACION, S. A., operators of airplanes for passenger and express transport from Tampico.

FAIRCHILD

THANK YOU *for mentioning* **AVIATION**

Airport Floodlighting



"Daylight at Night" Illumination produced by B. B.T. Air Mail Type Landing Floodlight

Intensity

An intensity of illumination that approaches the conditions for landing in daylight is essential for safe night landings. Maximum intensity insures the maximum safety.

The B.B.T. Air Mail Type Landing Floodlight illuminates the entire airport.

Landings may be made on any part of the field and in any direction. Surrounding trees, buildings and and other low obstacles, are made clearly visible to the pilot. This all insures safety.

Eventually every airport will require this most economical and efficient floodlighting.

The intensity is the maximum produced for airport illumination. It covers the largest area. Absolute freedom from glare is provided by a newly added feature. Adequacy for the future is assured.

Every airport lighting requirement is provided by B.B.T.—Beacons, Boundary, Obstacle and Ceiling Lights, Landing Floodlights and Exterior and Interior Hangar Floodlights.

CONSULT THE PIONEERS IN AVIATION LIGHTING
CATALOG GLADLY FORWARDED UPON REQUEST

B.B.T. CORPORATION OF AMERICA
ATLANTIC BUILDING PHILADELPHIA PENNA.

THANK YOU *for mentioning* AVIATION

Red Arrow Monoplanes

MANUFACTURED BY THE SIMPLEX AIRCRAFT CORPORATION, DEFIANCE, O.

2 PLACE OPEN 2 PLACE CLOSED 3 PLACE CLOSED

Speed—Cruising 110 M.P.H.—Top 120 M.P.H.—Landing 38 M.P.H.—Cruising Radius 1200 Miles. *Power*—Kinner 100 H.P. 5 Cylinder Radial Aircooled Motor—Others at Adjusted Price. Wing Spread 33′ 4″—Length 20′—Seating Side by Side—Control Dual. *Very Desirable Sales Territory Open.*

THANK YOU *for mentioning* AVIATION

Wax *free*

gives a tougher, heat-resisting body [*all weather protection*]

More interesting than its rigid specifications is the performance record of A-M-L-O. *After twenty hours of high speed running in a Curtiss OX-5 motor A-M-L-O was drained and tested. The body was still good, and dilution was hard to notice . . . the oil was too good to throw away.

**Name and full details on request.*

Free Pilots Log book, 36 pages of blank forms with handsome, durable cover. Free to you, send the coupon.

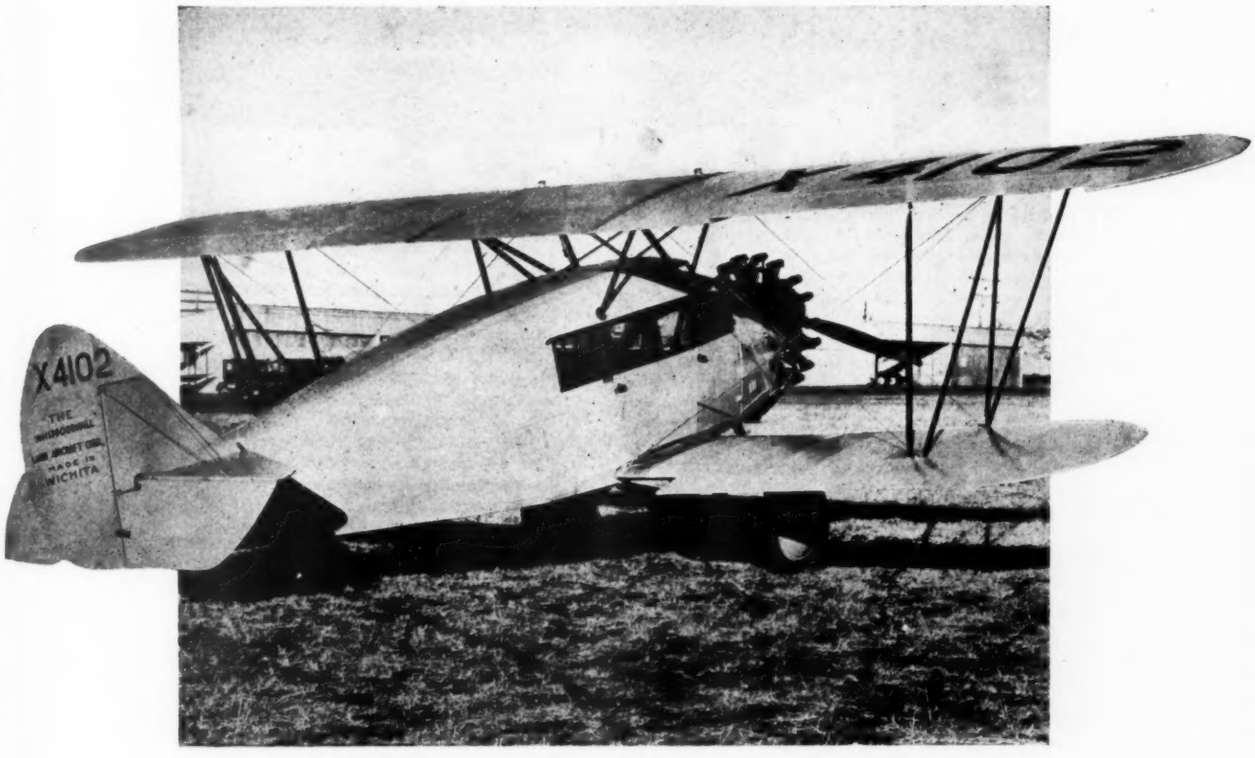
Texas Pacific Coal & Oil Co.
Fort Worth, Texas

Please send me without obligation your Pilots Log book described above, and oblige.

Name .....
Address .....
City ..... State .....
Your Dealer's name .....

The WHIPPOORWILL

POWERED WITH THE WRIGHT WHIRLWIND



A closed type biplane with pleasing lines ... a performance that satisfies ... and fully equipped. For complete information write or wire . .

THE LAIRD AIRCRAFT CORPORATION

Wichita, Kansas

THANK YOU *for mentioning* AVIATION

FOR EVERY COMMERCIAL PURPOSE - OVER LAND AND SEA

OVERSEA
Air Commuting
Ship-to-Shore
Photography
Beach Hopping
Air Yachting

LOENING
The Amphibian Proven Practical

INLAND
Air Transport
Field Hops
Air Mail
Company Freight
Land Surveys

Opens a new era
with

THE LOENING CABIN AMPHIBIAN

AFFORDING the commercial and private operator a variety of airplane possibilities and usages of more complete scope, justifying the higher first cost by economy in the long run, due to wider use and longer life.

EQUIPMENT - Muffler, heater, electric inertia starter, Standard Steel Propeller, complete cabin furnishings, triplex glass, lights, toilet, baggage holds, anchor and line, all instruments, including compass and turn indicator, double fuel pump system, fire extinguishers, wheel brakes (optional), pilot's compartment and passenger seating capacity normally for four but can be arranged for six.

PERFORMANCE - 120 miles per hour, high speed, 14,000 feet ceiling, with 140 gallons gas, 12 gallons of oil, pilot, and equipment and 1200 lbs. pay load.

Price — Delivered for flight, New York — $24,700

LOENING AERONAUTICAL ENGINEERING CORPORATION
31ST STREET AND EAST RIVER, NEW YORK CITY

LOENING

MORE THAN 100 Loening Amphibians have flown over 2,500,000 miles in all parts of the world and in all climates and the work that has been done by this unique plane for the United States Government in the Army, Navy, Marine Corps and Coast Guard Air Services during the past four years has well earned the title of "The Plane That Does The Hard Work For America".

FROM THE very inception of its development the Loening Unit Hull type, which is patented, has always been an Amphibian — logical in its design — extremely convenient and efficient in its layout and after long experience entirely perfected in its surprisingly normal, easy and stable flying qualities. There has been no occasion in the development of this outstanding airplane type for after thoughts of adding floats to a land plane or adding wheels to a float seaplane. The Loening type, is actually the first *real* Amphibian and practically the only Amphibian available today with any serious amount of service behind it to insure its satisfactory operation and its status as an already finished product.

Available now for commercial, civil and private use, the Loening Cabin Amphibian is a sensible and practical development of the Government planes and incorporates all of the characteristics, and perfections that hard experience and constant usage of the past have developed.

ABILITY AS A STURDY LAND PLANE of this type is such as to permit its use continuously from Inland Fields of even a very rough character. The take-off with the air cooled engine is quick and the wing loading is light. Usage, which is the real test, has proven that there is ample ground clearance of the keel and never has the Loening Amphibian suffered from limitations on this score, particularly as the keel itself is so greatly reinforced that actual land landings have often been made with the wheels up with no injury. The Cabin Amphibian, itself, as a land plane is a normal tractor biplane of the most widely used land type, with large wheels and tires and easy cabin access.

SEAWORTHINESS AS A FLYING BOAT of this airplane has been found surprisingly good under the most difficult conditions. The hull has been made very strong and serviceable with its Loening type of composite metal covered construction and with the water-tight nose there is no possibility of shipping water in breaking seas, as in a "pusher" flying boat. The propeller in front immediately rises well clear of the water under way and is far ahead of the spray, as well as protected by the hull beneath it and yet, experience and usage (which again is the only real criterion) show constantly that the tractor arrangement, so desirable for every flying and safety reason, has no disadvantage in comparison to the older type of "pusher" boats, (yet gets away from having the engine poised back of the passengers). Upon coming to a mooring the forward position of the pilot enables him to pick up a line, either from his seat or from the lower wing, and with propeller still running this line is fastened to the side chock. As soon as the propeller is stopped it is transferred to the bow, if desired, for a heavy blow. The ease with which anchoring and mooring operations can be taken care of by merely bringing the mooring to the side of the hull has been a revelation.

With the propeller stopped, passengers can be taken aboard at the bow and have access to the cabin with steps that are provided, in quite as easy a manner as any other type and with line again merely transferred from the bow to the side chocks the pilot is able to start his engine and warm it up before casting off and can cast off his line or raise his anchor without the slightest difficulty while running his engine.

AIRWORTHINESS AS AN AIRPLANE — of the Loening Amphibian has been developed to a state of perfection where it is admittedly today one of the finest flying airplanes of any type now in service. Whether over land or water, wheels up or down, this surprisingly versatile plane proves to be a perfect flying machine, stable in rough air, handy and normal on all controls and easy to land and taxi.

THE AIR is over everything and is a highway with access to all places, but the airplane can only be considered to have really started on its dominating career when it is endowed with ability to land and operate from both land and water. This time has now arrived. And an even bigger, more sensible and more practical era of flying opens up before us.

LOENING AERONAUTICAL ENGINEERING CORPORATION
31ST STREET AND EAST RIVER, NEW YORK CITY

THE DOUBLE DUTY OF TIRES

THE opened throttle commands airplane tires to be fleet and nimble, to spin easily and swiftly as the ship hurries into flight.

And then, the journey over, these same tires must bear speeding weight and human life to safety as the plane strikes ground again.

Thus, in every flight Goodyear Airplane Tires reveal their agility and their strength. These tires assist take-off performance because they are perfectly balanced and hold their proper pressures. They withstand the punishment of fast or awkward landing because they are built of finest materials by men who know how important tires are to safety.

Goodyear Airplane Tires are offered by an organization that wants aviation to prosper. Goodyear makes everything in rubber for the airplane.

Aeronautics Department

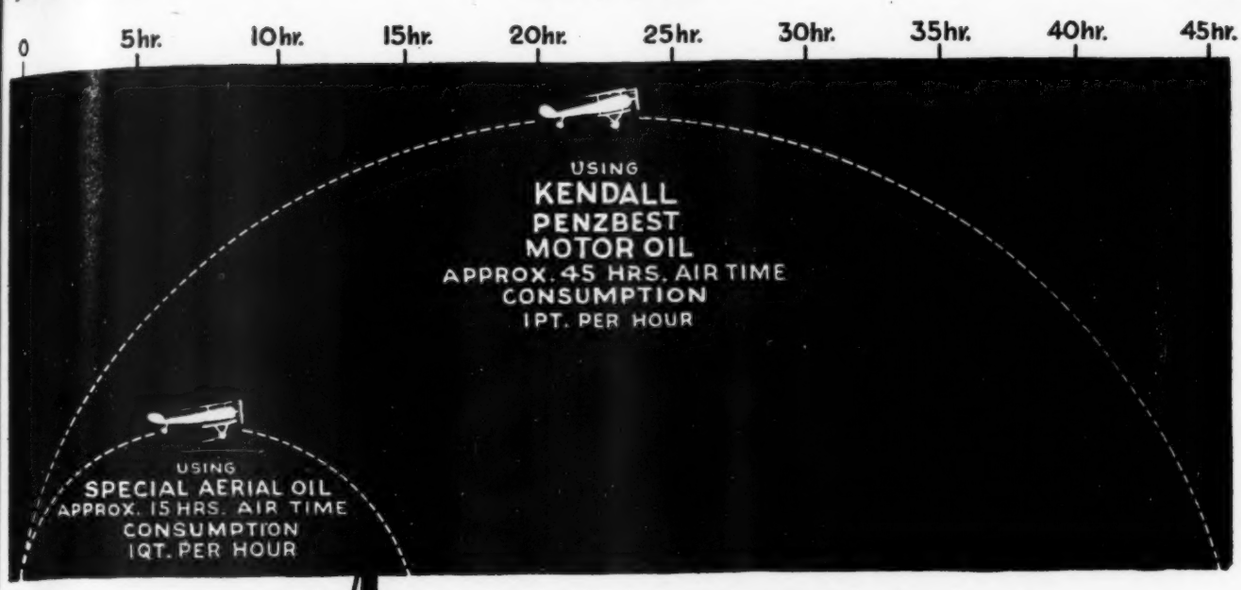
THE GOODYEAR TIRE & RUBBER COMPANY, INC., AKRON, OHIO

GOODYEAR

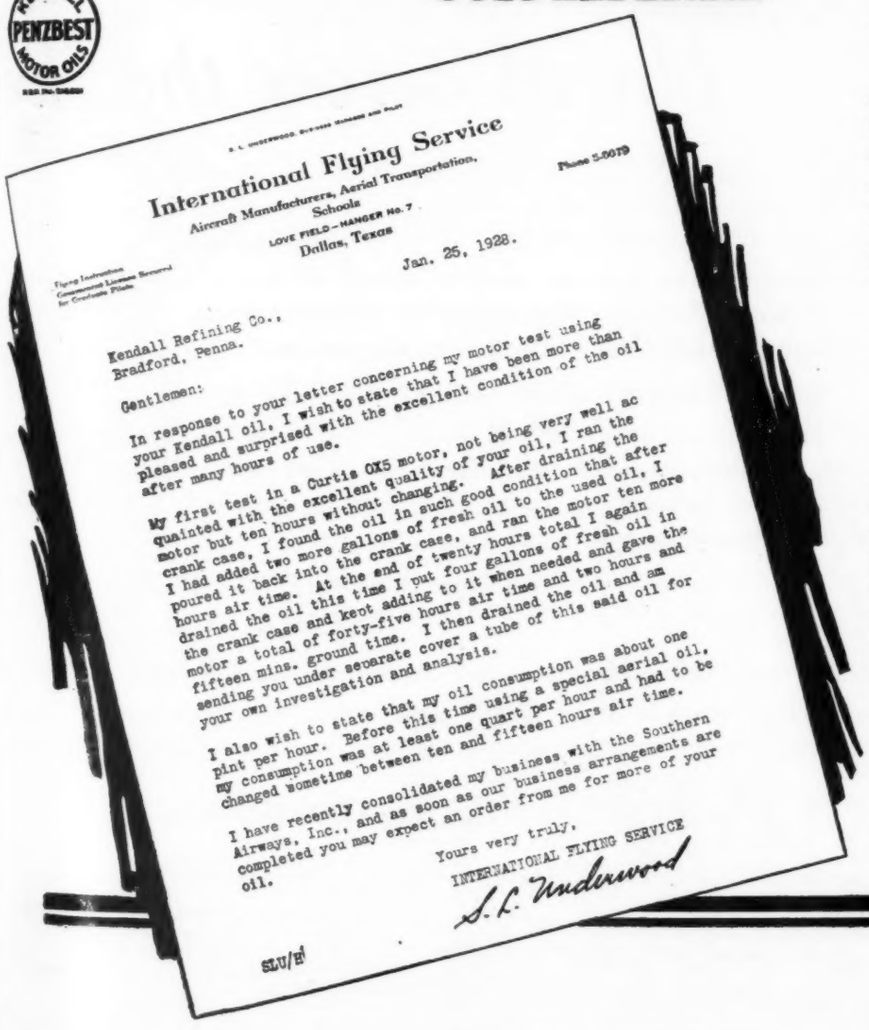
Copyright 1928, by The Goodyear Tire & Rubber Co., Inc.

AIRPLANE TIRES

THANK YOU *for mentioning* AVIATION



Air time *tripled*
Oil consumption per hour cut in half



International Flying Service

Aircraft Manufacturers, Aerial Transportation, Schools

LOVE FIELD – HANGER No. 7
Dallas, Texas

Phone 2-0079

Flying Instruction
Commercial License Secured
for Graduate Pilots

Jan. 25, 1928.

Kendall Refining Co.,
Bradford, Penna.

Gentlemen:

In response to your letter concerning my motor test using your Kendall oil, I wish to state that I have been more than pleased and surprised with the excellent condition of the oil after many hours of use.

My first test in a Curtis OX5 motor, not being very well acquainted with the excellent quality of your oil, I ran the motor but ten hours without changing. After draining the crank case, I found the oil in such good condition that after I had added two more gallons of fresh oil to the used oil, I poured it back into the crank case, and ran the motor ten more hours air time. At the end of twenty hours total I again drained the oil this time I put four gallons of fresh oil in the crank case and kept adding to it when needed and gave the motor a total of forty-five hours air time and two hours and fifteen mins. ground time. I then drained the oil and am sending you under separate cover a tube of this said oil for your own investigation and analysis.

I also wish to state that my oil consumption was about one pint per hour. Before this time using a special aerial oil, my consumption was at least one quart per hour and had to be changed sometime between ten and fifteen hours air time.

I have recently consolidated my business with the Southern Airways, Inc., and as soon as our business arrangements are completed you may expect an order from me for more of your oil.

Yours very truly,
INTERNATIONAL FLYING SERVICE
S. L. Underwood

SLU/gf

WITH the average oil it is customary to change after about ten hours flying. With KENDALL PENZBEST Motor Oil this period ordinarily is not reached until after about 30 hours flying.

KENDALL PENZBEST Motor Oil holds up because:

It is refined from 100% Bradford grade of Pennsylvania Crude Oil —the highest priced and highest grade of crude oil in the world.

The process of refining removes all the wax that is mechanically possible.

When you drain KENDALL PENZBEST Motor Oil out of your crank case, its condition will convince you that every moving part of your motor has been protected by a film which prevents metal contact, reduces friction to a minimum and eliminates repairs usually caused by faulty lubrication.

KENDALL REFINING COMPANY
Bradford, Pa.

KENDALL PENZBEST MOTOR OIL

Fueling up the plane "Eddie Stinson" in preparation for flight from Detroit to Jacksonville where the record was made.

A new flying record that has been blazed across the sky

A New Enlarged Aviation Manual

Sixty-nine pages of valuable information for pilots and others interested in Aviation. A manual that discusses authoritatively and impartially airplane motors, aero gasoline and oil. An airway guide that lists the airports and landing fields throughout the Middle West and names 1,800 towns and cities where this company maintains a stock of

Stanolind Aviation Gasoline *and* Stanolind Aero Oil

Your copy will be sent upon your request.

AN endurance flight demanding of pilots, plane, fuel and lubricants sustained performance never before equaled in airplane flying . . . performance by which Eddie Stinson and George Haldeman have written another epoch in man's conquest of the air, as the following telegram to Mr. Allen Jackson, Vice-President of Standard Oil Company (Indiana), testifies:

"We successfully broke world's sustained flight in fifty-three hours thirty-six and one-half minutes today using Stanolind Aviation Gasoline and Stanolind Aero Oil. Gas consumption approximately ten gallons per hour. Oil consumption five gallons entire flight. Thanks to your products."

(Signed) EDDIE STINSON
GEORGE HALDEMAN

Stanolind Aviation Gasoline and *Standard Aero Oil* have thousands of flying hours to their credit and never has there been a single engine failure traceable to faulty combustion or improper lubrication.

STANDARD OIL COMPANY
(INDIANA)

General Offices: 910 S. Michigan Ave. CHICAGO, ILLINOIS

ILLINOIS	INDIANA	IOWA	S. DAKOTA	N. DAKOTA	Milwaukee	MISSOURI
Chicago	Evansville	Davenport	Huron	Fargo	Green Bay	Kansas City
Decatur	Indianapolis	Des Moines	MICHIGAN	Minot	MINNESOTA	St. Joseph
Joliet	South Bend	Mason City	Detroit	WISCONSIN	Duluth	St. Louis
Peoria	KANSAS	Sioux City	Grand Rapids	La Crosse	Mankato	
Quincy	Wichita		Saginaw		Minneapolis	

Genuine Hookless Fastener. Will not jam, rust or break. Launders with perfect safety. Absolutely Guaranteed.

Richard F. Karman, Chief Mechanic, B. F. Mahoney Air Craft Corp. Builder of Lindbergh's Spirit of St. Louis. He wears Whizits.

Flying Suits! Ground Suits!

—The Handiest, Speediest, Most Comfortable Suits in the World!

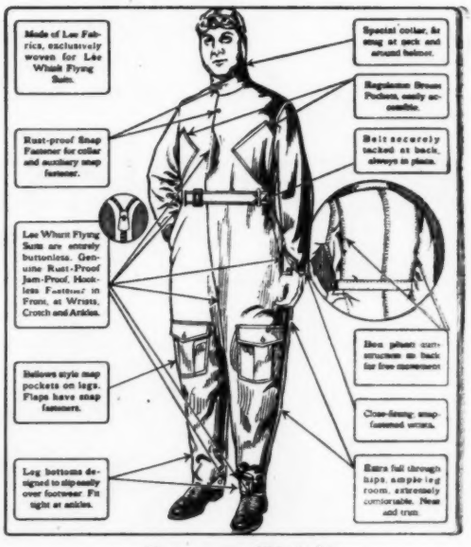
Lee Flying Suit
Summer Weight

Lee Flying Suit
Winter Weight

THEY must be! The Whizit feature (genuine Hookless Fastener) means fast, sure, comfortable adjustment—no buttons to bother—on and off in an instant—speed and comfort in every detail.

Service? The same famous Lee quality is built into these garments that has made Lee the largest company in the world in its field.

These suits have made good at famous flying fields and on world-famous trans-oceanic flights. Both deserve their tremendous popularity and your preference. Mail coupon below.


Made of Lee Fabrics, exclusively woven for Lee Whizit Flying Suits.
Special collar, fits snug at neck and around helmet.
Regulation Breast Pockets, easily accessible.
Belt securely tacked at back, always in place.
Rust-proof Snap Fastener for collar and auxiliary snap fastener.
Lee Whizit Flying Suits are entirely buttonless. Genuine Rust-Proof Jam-Proof Hookless Fastener in Front, at Wrists, Crotch and Ankles.
Bellows style map pockets on legs. Flaps have snap fasteners.
Close-fitting snap-fastened wrists.
Leg bottoms designed to slip easily over footwear. Fit tight at ankles.
Extra full through hips, ample leg room, extremely comfortable. Neat and trim.

Summer Weight

UNION MADE

Lee WHIZIT

Flying Suits ~ Union-Alls

H. D. Lee Mercantile Co.
Kansas City, Mo., Trenton, N. J., Minneapolis, Minn., South Bend, Ind., Salina, Kans., San Francisco, Calif.

Please mail me prices and full details on the Lee Whizit Flying Suit.

Name_____

Address_____

"CORSAIR"

The Stock Airplane which holds Four World Records

OUTSTANDING among the notable achievements in Aeronautics during 1927 was the capture of four World Records by the new Vought "Corsair" Airplane.

Outstanding because these World Records — one for altitude and three for speed — were made with a *strictly stock* service "Corsair" seaplane.

Outstanding because these records were made without special preparations, the airplane, engine and propeller being the original service equipment.

And each and every "Corsair" is guaranteed to equal or better these world record performances, and is sold with such a guarantee.

¶ 3,203,000 MILES — 28,175 HOURS — is the official record of flying done in Vought Airplanes during 1927 — what can speak more highly of their popularity and reliability?

VOUGHT

"Preferred Airplanes"

AVIATION

The Oldest American Aeronautical Magazine

EARL D. OSBORN, *Publisher*
LESTER D. GARDNER, *Director*
GEORGE NEWBOLD, *Business Manager*
ALBERT F. MULLADY, *Asst. Business Manager*
R. SIDNEY BOWEN, JR., *Editor*
RICHARD M. MOCK, *Technical Editor*
HERBERT F. POWELL, *News Editor*
DAVID J. LEISK, *Art Editor*

Vol. XXIV *April* 30, 1928 No. 18

Index to Contents

EDITORIALS 1205
THE ALL-AMERICAN AIRCRAFT SHOW IN RETROSPECT 1206
A DESIGNER'S IMPRESSIONS OF THE DETROIT SHOW 1208
WING STRESS ANALYSIS 1210
THE HALPIN "FLAMINGO" 1211
THE DETROIT S.A.E. MEETING 1212
NEWS ..... 1213 TO 1234
SIDE SLIPS 1257
FOREIGN NEWS 1258
AIRPORTS AND AIRWAYS 1260
U. S. AIR FORCES 1268
INDEX TO ADVERTISERS 1276

AVIATION PUBLISHING CORPORATION
Business and Editorial Offices
250 West 57th St., New York City
Cable Address: AEROENG

Publication Office: Highland, New York

Subscription price: Four dollars per year. Canada, five dollars. Foreign, six dollars. Single current copies, twenty cents. Back numbers, 25 cents. Advertising rates on application. Issued every Monday. Forms close ten days previously. Entered as second-class matter Nov. 22, 1920, at the Post Office at Highland, N. Y., under act of March 3, 1879.

Copyright 1928 by Aviation Pub. Corp.

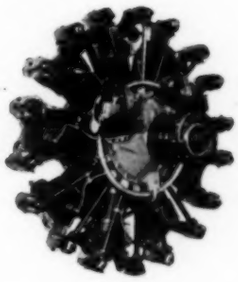
For Your Convenience in Subscribing

Please send AVIATION to

....
.....
.....

Enclosed find check ( ) money order ( ) for $ . . . .

The Stinson "Detroiter" Monoplane, holder of the world's endurance record, powered with 200 hp. Wright "Whirlwind"



equipped with

SCINTILLA
Aircraft Magnetos

SCINTILLA MAGNETO COMPANY
SIDNEY, NEW YORK
Contractors to the U. S. Army and Navy

URDAY, MARCH 31, 1928.
$195
800
RKET
Stinson Plane Makes Record of 53½ Hours
American Flyers in Florida, Favored by Good Weather, Beat German Endurance Mark by Over an Hour
Special Dispatch to The Wor
JACKSONVILLE, Fla., March 30.—
Sacte Stinson and George Haldeman
to-day brought the world's duration
record back to the United States.
Shortly after 1 o'clock this afternoon
they brought their Stinson-Detroiter
single-motored monoplane down on
Jacksonville beach, after circling over-
head for 53 hours 36 minutes 30 seconds.
They had beaten the German record of Risler and Bäumer by 1 hour 13 minutes 30 seconds. The rules required that they beat the old record by an hour before it could be considered official.
The weather, except for some shop-
pinnes in the air which forced them to
climb high for a time, had favored
them ever since they went up early
Wednesday morning. A few hours after
they came down a rainstorm broke.
Stinson, who designed the plane and
built it in his Detroit factory, has re-
gained a record which he took in 1921
with about half the time of his present
flight. He and Haldeman tried to
break the German record last Decem-
ber at Detroit but were forced to give
up when ice formed on the wings of
the plane.
A big crowd cheered them enthusi-
NEW
316

It was a 53½ Hour Record for Stinson-Haldeman

but a 453½ HOUR Record for the Wright Engine

THE official record of Stinson-Haldeman who made the new endurance flight March 30th was 53 hours, 36 minutes, 30 seconds...but the Wright Whirlwind Engine that powered the Stinson-Detroiter monoplane had 400 hours flight behind it before it went up to establish a new proof of endurance and sustained performance.

Once again the engine used by Lindbergh, Chamberlin, Byrd and other record-making pilots proves that the sound design and unhurried workmanship given Wright Engines produces a power-plant whose performance is limited only by fuel.

WRIGHT

WRIGHT AERONAUTICAL CORPORATION
Paterson, New Jersey, U. S. A.

CANADIAN WRIGHT LIMITED, Sole Licensees for Canada, Montreal

AVIATION

The Oldest American Aeronautical Magazine

Vol. XXIV | *APRIL* 30, 1928 | No. 18

Counting the Cost

THE GREAT success of the aeronautical show at Detroit will undoubtedly make a large number of cities want to stage similar affairs. Chambers of commerce, boards of trade and professional organizers of exhibitions will undoubtedly see a new and profitable outlet for their energies. Many of these organizations will have the highest motives in the world and a real desire to promote aeronautics as well as to boost themselves, and they will not be able to understand why the aeronautic industry does not wish to back a show in every large town in the country. The truth is however, that as far as the industry is concerned even the Detroit show did not carry itself. One company estimated that the show expenses including the cost of putting up its exhibit, the salaries and expenses of salesmen and executives, the special literature and advertising cost around $5,000. Other exhibitors may not have spent as much but if the expenses of the accessory people are included the total cost to the industry must have run into hundreds of thousands of dollars.

If shows of the magnitude of that put on at Detroit were put on in very many cities the cost to the industry would be disproportionate to the volume of aeronautical sales which have so far been reached. There are undoubtedly other forms of sales outlets which would produce more direct results for the same or less cost. The expense to the industry could be cut down by reducing the number of exhibits but this would not create the impression of a large show. In fact a small list of exhibitors in a large city might do more harm than good. A few good shows each year are of great value to the industry in the forming of dealer and distributor contacts, but if there were a large number of shows this advantage would not be continued.

Flying Clubs

THE QUESTION has been asked as to why England has so many successful flying clubs while we have lagged behind in this development. The answer lies partly in the fact that the English Clubs are subsidized, and partly in the fact that in this country almost every town with a flying field has a commercial flying service, which among other things gives instruction at rates which are nearly as low as those which could be charged by a flying club not subsidized or endowed. To a large extent our flying schools, and the instruction which will be given by manufacturers in their attempts to increase the sales of their planes, fill the requirements for primary training. The club which is based on the idea of giving primary training has to meet the competition of the commercial schools which are more efficiently managed than most clubs.

It would seem logical to have the flying clubs organized along lines that would supplement and not compete with the existing flying schools. If they are to be successful they should fill a need and supply a service which is not supplied by the commercial schools. There should be room for a club whose members have soloed but who wish to get in enough flying time to obtain their professional pilot's license at the lowest possible cost, and, while they are working at other trades.

Another idea which would supplement rather than compete with the existing flying schools is that of a club run along social lines. The members of such a club would not be expecting to earn their living out of professional piloting but would be flying for fun or, incidentally, to their businesses. It should have a good club house with a restaurant and possibly a tennis court or swimming pool. Membership would be rather exclusive and if properly sponsored non-flying members would join for the social opportunities offered and this would help form an endowment which would lessen the cost of flying. At the present time there may not be enough private fliers to organize such a club except in the larger cities but the idea is basically sound, whereas the formation of a club which is merely a flying school disguised under another name is not sound and is really unfair to the local commercial schools.

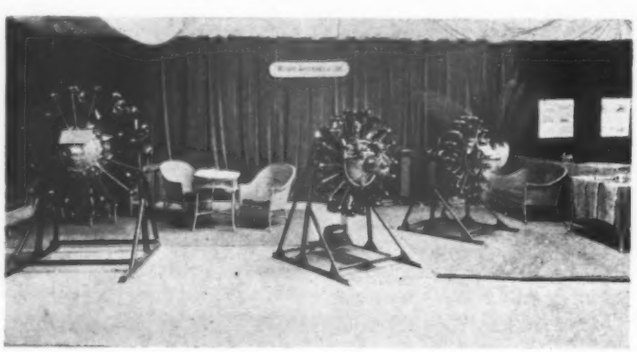
Fuelless Engines

THERE HAVE been so many claims for super engines that those who really have a background of good technical experience have grown very skeptical about the possibilities of radical developments. To the layman the fact that our present power plants only deliver about twenty per cent. of the energy in the fuel makes them believe that there is still room for improvement. The layman feels that an engine which uses only one stroke out of four for the power impulse can be improved. If recent German claims of the building of a jet propulsion motor are true, a revolutionary development in high speed flying is forecast. Wireless power and atomic energy are attractive fields to speculate on while the gas turbine is the happy hunting ground of every amateur inventor. Some day the revolutionary discovery may be made but in the meantime the stock of the Wright company still sells at a good figure on the stock exchange.

The All-American Aircraft Show *in* Retrospect

By R. SIDNEY BOWEN, JR.

IF IT is possible to select any one great outstanding feature of the All-American Aircraft Show held this month in Convention Hall, Detroit, Mich., it is the fact that the array of airplane, engine and accessory exhibits surpassed in attractiveness and interest the predictions of even the most optimistic. Never before in the history of aeronautics has there been housed together under one roof such a collection of aircraft, military or commercial, as there was in Convention Hall. In previous aircraft shows military planes were in the majority but at the Detroit Show, of the 58 planes exhibited only one was a military plane. In every respect it was a display of American progress in commercial aeronautics and it demonstrated to its backers, and the industry at large, that not only can an aircraft show have as great a pulling power as an automobile show but that in the very near future it will serve as great a sales outlet for the aeronautic industry as automobile shows serve as sales outlets for the automotive industry.



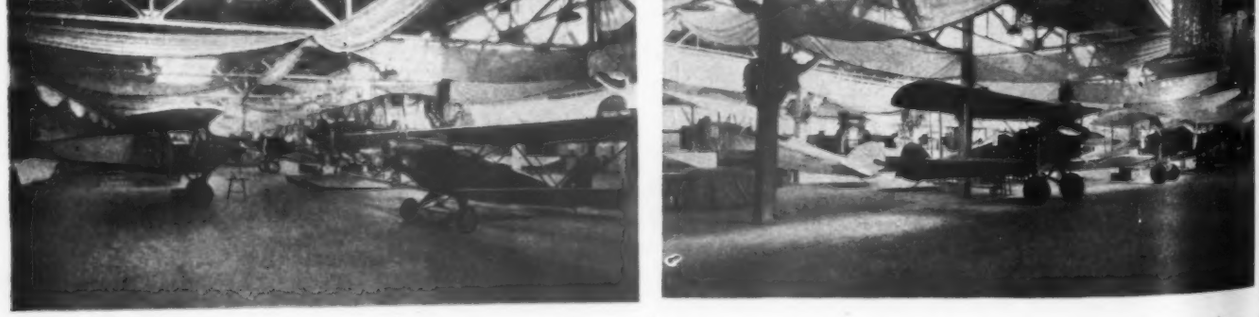
The Wright Aeronautical Corp. exhibit. The center engine is the cut away model of the Wright Whirlwind J-5.

Although official figures are unavailable at this time it is believed that quite a few plane sales were made during the show, to say nothing of the engine and accessory sales. A good portion of the plane sales were made to persons not connected with the industry which more or less proves that not all of the 150,000 persons, that are estimated to have visited the show, were simply interested spectators. It is undoubtedly true that the show cost the airplane manufacturers, in particular, far more than they took in by actual sales, but that to a large degree was compensated for by the exceptional opportunity offered to inspect competitors' products, make new acquaintances in the industry, line up distributors and dealers, and last but not least contact prospects that will result in plane sales in the near future.

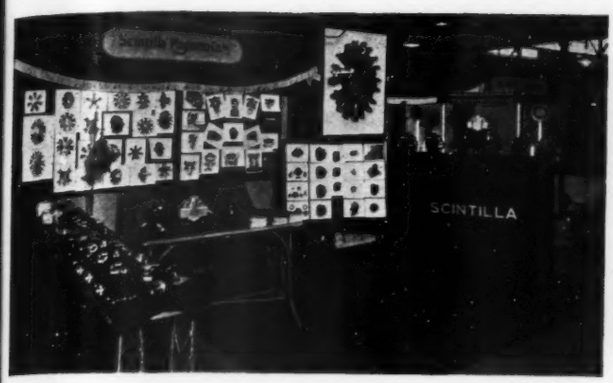
By actual count the plane exhibits consisted of: 25 biplanes, one of which was a Vought "Corsair", the only military plane exhibited; 24 monoplanes, three of which were historic (the Ford trimotor "Josephine Ford", the Stinson "Pride of Detroit" and a 1909 Bleriot); six seaplanes, including one Stinson monoplane fitted with pontoons; three amphibians; one flying boat; three stripped fuselages; two stripped wings; and one whole plane completely stripped.

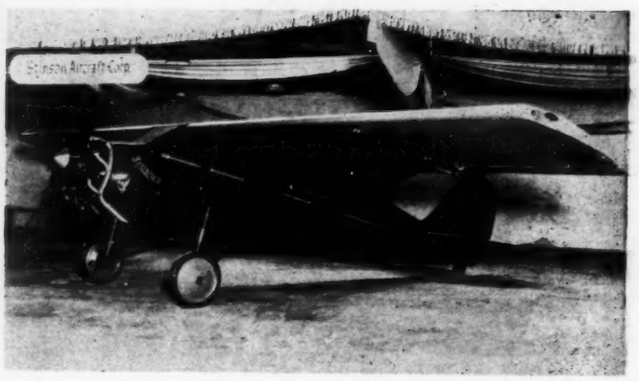
Outside of the refinements in design, power plant installation, etc., the various planes exhibited were featured by attractive color combinations, and nickel fittings. At first glance upon entering the Hall one was greeted with a kaleidoscopic picture of brilliantly colored wings and fuselages that stood out in bold contrast to the more sombre decorations that adorned the walls and ceiling of the various sections. As a means of improving the looks of future shows, it might be worthwhile to mention at this point that one part of Convention Hall was artistically decorated with white, purple and black trimming. This combination is really more appropriate at a mourning function than at an aeronautic display.

Although the planes were well arranged and each exhibit was attended by at least one member of the firm at all times, the lack of printed information was quite noticeable. Reference is not made to printed information such as handouts, etc., for in reality there was an abundance of such material,



Two general views of the Show. On the left can be seen a Driggs Dart, a Laird seaplane and land plane and a Wallace "Touroplane". On the right is the Advance Aircraft Co. exhibit with the Alexander Aircraft Co. display in the background.





The picture on the left shows the unique exhibit of the Scintilla Magneto Co. To the right is the Stinson "Junior" powered with a 110 hp. Warner engine. This plane was bought by the Union Trust Co., Detroit, Mich.

but rather to the lack of posters and cards hung on the planes giving data on the type of plane it was, its seating capacity, its uses, the type of engine installed, its performance, etc. True, some of the exhibits did include such information but the majority merely had the name of the company, the name of the plane and its price, F.O.B. factory.

Perhaps in the future when the various planes become as well known to the public as the automobiles are now, a limited amount of card and poster data will suffice, but at present, in view of the fact that the industry is striving to educate the public in aeronautics, it might prove much more beneficial to be as complete as possible in this respect.

Information Readily Supplied

One thing that is particularly worthy of comment in regard to all of the exhibits is the manner in which everyone connected with a display took the time and pains to give an intelligent and informative answer to all questions that were asked by visiting laymen. Ridiculous as some of the questions were they at least indicated an interest in aeronautics by non-flying men, women and children. The exhibitors appreciated that fact and realized that each inquirer was a potential prospect, if not at present then at sometime in the future, and therefore deserved sincere attention. In short, every exhibitor did all he possibly could to make every unairminded person airminded before he or she left the Show.

As far as could be noted no one particular plane received more favorable comment or attention than another. The visitors' likes and dislikes seemed to average more or less. However, there was one important point, regarding the displaying of airplanes, that proved its value at Detroit from the standpoint of attracting attention. This was the matter of exhibiting uncovered fuselages and wings. Only six of the forty odd airplane exhibits included this item and the attention they received from the Show visitors was of such extent that it would seem highly advisable for exhibitors in future aircraft shows to be sure to display either an uncovered wing or an uncovered fuselage, preferably both.

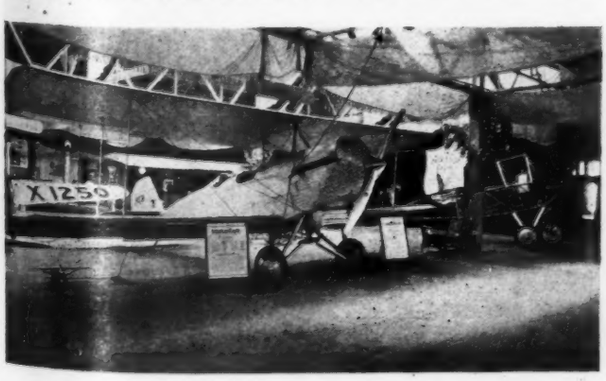
It is admitted that such an exhibit entails the additional cost of freight transportation, etc., whereas a plane can be flown direct to the city or town in which the show is being held. Nevertheless such additional costs are really warranted. Prospective dealers, in particular, like to inspect the structural design and workmanship of the product they contemplate selling. According to one exhibitor at the Detroit Show the presence of an uncovered fuselage in his exhibit was of great assistance in the matter of signing up several dealers.

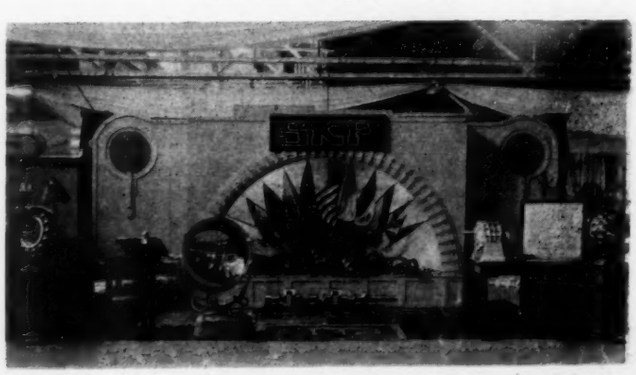
Then too, the public is extremely interested in viewing first hand structural details of an airplane, the manner in which the controls are operated, and the way the engine is installed, etc. All of these points are more or less concealed in the completed plane. Therefore, if an exhibitor arranges it so that prospective customers can see them, he not only adds to the interest of his display but helps himself and his representatives in the matter of making sales.

Attractive Layouts in Operation

What the engine and accessory exhibits lacked in the way of color schemes they made up for in attractive layouts in actual operation. In fact it might be stated that more time was spent by visitors in the examination of the exhibits included in these two divisions than in the airplane division. It is impossible to estimate the sales made but it is quite probable that they totaled an amount of several thousands of dollars. Because of the design of Convention Hall it was undoubtedly found impracticable to group the engine exhibits in one section and the accessory exhibits in another. As a result about two thirds of the exhibits in both divisions were grouped to-

Continued on page 1239



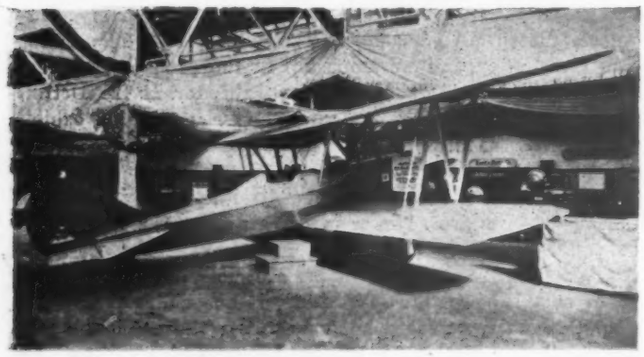


Part of the exhibit of the American Eagle Aircraft Corp. Note the uncovered fuselage displayed. The picture to the right shows the exhibit of SKF Industries, Inc.

A Designer's Impressions *of the* Detroit Show

By B. V. KORVIN-KROUKOVSKY

THE ALL-AMERICAN Aircraft Show held this month in Detroit, Mich., was the first aircraft exhibition since 1920, when a similar show was held in New York. To those remembering the 1920 Show, the comparison of the two gives very instructive ideas of the development which has taken place during these eight years, and also of the process of development continuing at present. Technical development is a slow process requiring much time and money. It is, however, a perfectly definite process, and, if the aim is clearly stated, the results will inevitably follow. Plenty



An Alexander Eaglerock powered with an OX-5 engine on display at the Detroit Show.

of capable scientists, engineers and workmen can be found; new processes and new methods of work can be devised; and even new materials can be discovered and also created, as strong aluminum alloys, and bakelite have been created. Everything is possible, provided the aim is clearly stated. The engineer's biggest problem is not to find the means of attainment, but to define clearly the aim to be attained. The history of engineering is full of examples of great wastes of effort, time and money for something that was not wanted.

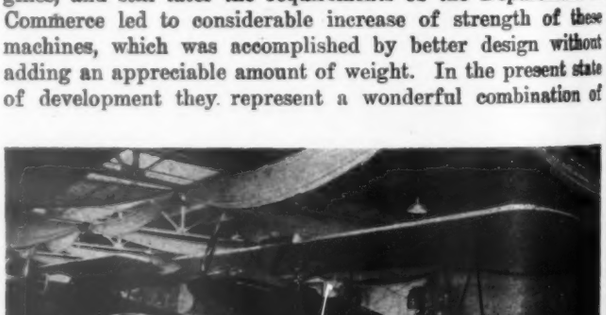
The National Aircraft Shows are particularly valuable to aeronautical engineers in that they collect in one room so many machines built in different parts of the country and to different ideas. Simultaneous examinations of so many materialized ideas makes it much easier for him to formulate in his mind the tendencies of development. Comparison of the shows of the past with the Show of the present point out to him the mistakes in foresight made before, and helps to avoid making such mistakes in future.

The New York Show of 1920 was composed of the achievements of military aeronautics at the end of the war on one hand, and of the courageous but inexperienced attempt of the aeronautical industry to enter commercial field on the other.

There was no experience in commercial application of aeronautics and there hardly was any demand for commercial airplanes. What was exhibited represented merely the theoretical ideas of the men at the helm of the aeronautical industry. Some of these ideas were impractical, some were good but premature, and very few indeed found any practical application.

The All-American Aircraft Show in Detroit, on another hand, demonstrated results of eight years of development of commercial aeronautics. At least one-half of the 52 airplanes exhibited there had previously proved their value in practical service. The remaining one-half represented speculative ideas regarding future requirements. Both are interesting to aeronautical engineers—one recording the past achievement, another pointing the way to future development.

Among the machines of proved practical value the first attention is justly claimed by three seater general purpose airplanes weighing between 2,000 and 2,600 lb., when fully loaded. There was little theory in the process of development of these airplanes. They were originally developed from the old Jenny under pressure of the demand for something better, and for a long time were limited to the use of OX-5 engines. Practice proved that the 3 seater airplane is the most convenient type for many commercial applications. Demand for such carrying capacity with the OX-5 engine led to the production of airplanes of very light weight and of excellent aerodynamic efficiency. Healthy competition fixed the low selling price. Subsequently, the demand for greater performance resulted in the installation of Wright Whirlwind engines, and still later the requirements of the Department of Commerce led to considerable increase of strength of these machines, which was accomplished by better design without adding an appreciable amount of weight. In the present state of development they represent a wonderful combination of



An International F-17 powered with an OX-5 and an F-18 cabin plane powered with a Wright Whirlwind.

aerodynamic refinement, light weight, structural strength and low price. At the Show this class was represented by Waco 10, Eaglerock, Swallow, Travel Air, Lincoln-Page, B. M. Laird, Challenger, American Eagle and International airplanes.

Developed for the same requirements, in direct competition and under influence of one upon another, the members of this class are very similar in general conception, materials and details of construction. All are single bay biplanes with

wire bracing and wood and fabric wings; all have ailerons on all four panels; all have two open cockpits, rear one seating a pilot and front one two passengers; and all have the split type landing gear. Seven out of nine types have welded steel tube fuselage and tail surfaces and all but one have a quickly adjustable stabilizer.

We know for a fact that these machines are low priced. Yet there is nothing in their design and appearance that suggests what theoretical designers call cheap. The fuselages are of good streamline form and vary in width throughout their length. The upper and lower wing panels are not interchangeable, the wing tips are nicely rounded and faired. At the roots wing panels fit snugly to the center section or to the fuselage, and there is no gap for hinges often found in military machines of several times their price. The tail surfaces have a variety of shapes pleasing the eye, and no attempt is made to make rudder interchangeable with ailerons or elevators. Were we not so accustomed to see the machines of this class quite often, and to think of them as cheap, we would find probably that they are rather complicated. One is inclined to believe that a monoplane with only two panels instead of four, and with half the number of fittings could be made much cheaper. As a matter of fact, it appears that cost of construction depends more on how conventional it is, than on how simple (theoretically) it is. A perfectly conventional design and concentration of attention on shop practice rather than on engineering seem to be responsible for the amazingly low price of these machines.

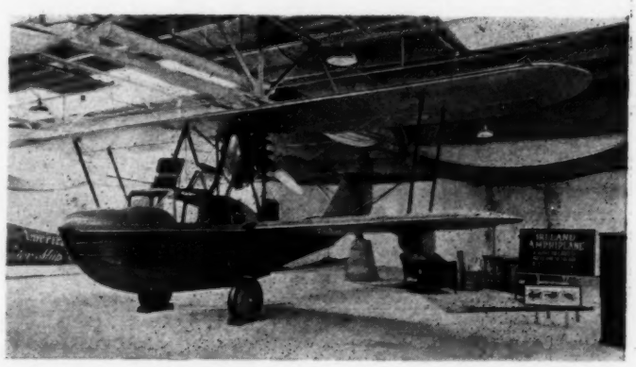
The Hamilton "Silver Streak", an all-metal monoplane powered with a Pratt & Whitney "Wasp" engine.

Do not Satisfy Popular Demand

Up to recent times the machines of the 3 seater 2000-2600 lb. class were used with the OX-5 engine. The desire of better performance and the lack of engines of somewhat greater power led to the installation of Wright Whirlwind of 2½ times power of the OX-5. This produced very powerful and necessarily expensive airplanes which have, however, somewhat exclusive application and do not satisfy popular demand for low priced airplanes. The supply of OX-5 engines appears to have shrunk before any other engine of suitable power attained wide recognition, thus putting manufacturers of this class of airplanes in rather an embarrassing position. They responded to this lack of certainty by providing for installation of any engine the customer may want. The machines at the Show were exhibited with OX-5, Fairchild, Siemens and Whirlwind engines. The Advance Aircraft Co.'s exhibit, for instance, featured all four of these installations. Such a state of affairs is obviously incompatible with quantity production, and complicates a good deal the production and the distribution of the machines to dealers and the public. It shows only the state of uncertainty of waiting for some of these engines to prove themselves or for some other engine to appear. There is little doubt that as soon as some of the air-cooled engines of moderate power (120 to 140 hp.) win wide recognition, that the manufacturers will make their selection and will standardize on one or another.

Another well-defined and well-proved class of commercial airplanes is formed by the Whirlwind engined five or six seater cabin airplane weighing fully loaded from 3500 to 3900 lb. While the airplanes of this class came into existence spontaneously some four years ago, without a long chain of development, they immediately were found to be in considerable demand. One of the reasons for this was the very high speed of these machines for the power of the engines and for the load they carried. When four years ago the Wright-Bellanca Monoplane won the speed race in New York competing with Navy airplanes, the aeronautical world was startled. Since then it has been startled time after time. Next the Bellanca machine broke the endurance record, then Lindbergh in a Ryan Monoplane crossed the continent and the ocean, then again the Bellanca flew to Germany, establishing a distance record. Then there came the wonderful trip of Brock and Schlee across the Atlantic, Europe and Asia in a Stinson Monoplane, and recently the endurance record was broken again in a Stinson Monoplane. Indeed the airplanes of this type have something to show.

The Wright engined cabin airplanes fall in two distinct groups—monoplanes and biplanes. It is fair to mention that all the laurels were won by the monoplanes. At the All-American Aircraft Show the monoplanes were represented by Bellanca, Fairchild, Ryan Brougham and Stinson, while the biplanes were represented by Buhl Airsedan and International Air Coach. All the monoplanes are characterized by wings of uniform section and thickness hinged at the top of the fuselage, and externally braced by struts attached at the bottom of the fuselage. In all the monoplanes and in the Buhl biplane the fuselage is of welded steel tube construction and of sufficiently large size to allow the arrangement of a spacious cabin. In all of the four monoplanes at the Show the pilot's seat is in the same cabin and in front of the passengers. The spaciousness and the comfort of the cabins in the airplanes of only 200 hp. is quite surprising. The upholstery and the finish in these cabins suggest that aeronautical engineers of today must be quite versed in automobile body design. No attempt is made to provide the silencers, but the use of exhaust manifold, directing the exhaust under the cabin is quite universal. This feature, combined with sound deadening upholstery of the cabin, probably reduces the noise until it is no longer bothersome for passengers. The control cables follow along upper corners of the cabin or under the floor and are not noticeable at all. The use of adjustable stabilizer is quite universal.



The Ireland "Neptune", one of the two amphibians at the Show. It is powered with a Wright Whirlwind.

The gasoline tanks are located in the wings and are hardly noticeable, as the naturally thick wings of the monoplanes allow plenty of room for their installation.

Continued on page 1251

Wing Stress Analysis

Stress Analysis of Commercial Aircraft, Chapter Number Eight

By PROFESSOR ALEXANDER KLEMIN

Daniel Guggenheim School of Aeronautics

And GEORGE F. TITTERTON

Late of the Bureau of Aeronautics, Navy Department

A CONVENTIONAL semi-cantilever monoplane will be designed and analyzed to indicate the application of stress analysis rules in an actual case. In this Chapter the wings only will be analyzed.

The plane is a three-place, semi-cantilever, cabin monoplane, equipped with an air-cooled radial engine rated at 130 hp. A three view drawing of the plane is given in Fig. 55.

Detail of Wings

The wing beams and compression struts are of spruce with round tie-rods in the drag truss. The supporting or lift struts are of round steel tubing streamlined with spruce. They are pinned at both ends. It may be seen in Fig. 55 that these struts join at the lower longeron at a point midway between

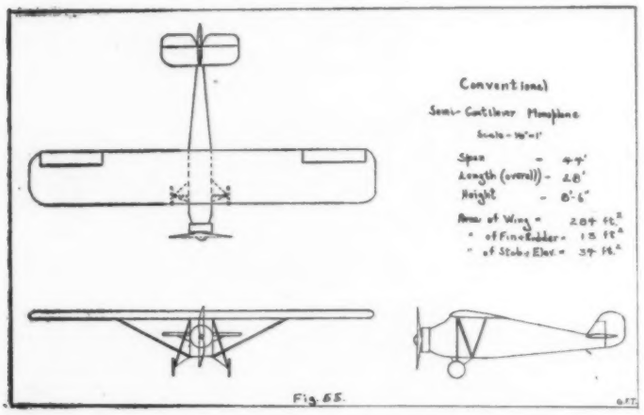

Conventional
Semi-Cantilever Monoplane
Span - 44'
Length (overall) - 28'
Height - 8'-6"
Area of Wing - 284 ft²
" of Fin & Rudder - 15 ft²
" of Stabs & Elev - 37 ft²

Fig. 55.

the spars. For the first drag bay outboard of the fuselage the ribs are spaced 12 inches apart and thereafter 15 inches apart. All drag bays are of the same dimensions, namely 60 inches by 42 inches. The wing spars are pinned horizontally at the fuselage. The wing loads are carried through the fuselage by steel tubing in place of the spruce beams. A 50 gal. gas tank is hidden in the contour of the wing directly over the fuselage.

The wings will be analyzed for the high incidence condition only. The analysis of the low incidence and inverted flight conditions is very similar. All tables of data and calculations will be made up for a complete analysis and it will be indicated in each case how the low incidence and inverted flight values are obtained. Whenever the analysis of these conditions varies from that of high incidence, they will be treated in detail. It would be advisable to fill in the blanks in the tables for low incidence and inverted flight for practice in making the computations.

General Data.

Airfoil Section—Clark Y
Gross Weight of Airplane (fully loaded)—2210 lb.
Weight of Wings (1.25 lb./sq. ft.)—355 lb.
Net Weight of Plane—1855 lb.
Total Span—44 ft.
Length of Center Section—3 ft. (fuselage, no wing.)
Length of bay—10 ft.—120 inches
Length of overhang—10.5 ft.—126 inches.
Chord—7 ft.—84 inches.
Incidence—0°
Dihedral—0°
Area of Wing (including ailerons)—284 sq. ft.
Location of wing spars in per cent. of chord from leading edge: Front spar—15% Rear spar—65%
Center of Pressure in per cent. of chord:
H.I.—31% L.I—51% I.F.—31%
Load Factors required:
H.I.—6.9 L.I.—4.5 I.F.—2.76
Ratio of chord to beam components:
H.I. = —0.144 L.I. = 0.15

Explanation of General Data.

The gross weight of the plane is made up of the following items:

Propeller	65 lb.	(metal propeller.)
Engine	360	(approx. wt. of 130 hp. engine)
Oil and Tank	45	(5 gal. × 7.5 lb. = 37.5 lb. and 7.5 lb. tank)
Power Plant Equip	50	(instruments, piping, etc.)
Pilot	165	
Chassis	130	(wheels, struts, shock absorber.)
Gas and Tanks	330	(50 gal. × 6 lb. = 300 lb. and 30 lb. tank.)
Wings	355	(284 sq. ft. × 1.25 lb.)
Fuselage	220	(steel structure, seats, fairing, etc.)
Passengers	330	
Baggage	100	(if ship is overweight, baggage is reduced)
Tail skid	10	
Tail surfaces	50	(about 1 lb. per sq. ft. of area)
Total:	2210 lb.	= Gross Weight.

The area of the wing is the total span minus 3 feet allowance for the fuselage, multiplied by the chord, and then reduced 3 sq. ft. because of the curved tips. That is $(44 - 3) \times 7 - 3 = 284$ sq. ft.

The center of pressure for the Clark Y is obtained from Table 15 of Chapter 7 of this series.

Load factors required: The power loading is 2210/130 = 17 lb./hp. Referring to Fig. 1 of Chapter 3 the required high incidence factor is 6.88 say 6.9. Low incidence = 6.9 × .65 = 4.5. Inverted flight = 6.9 × .40 = 2.76.

The ratio of chord to beam components is obtained from Table 15 of Chapter 7 for the Clark Y section.

Continued on page 1244

The Halpin "Flamingo"

New All-Metal Six Passenger Cabin Monoplane Powered with a "Wasp" Engine has a Top Speed of 140 M.P.H.

ONE OF the new designs that was exhibited for the first time at the All-American Aircraft Show in Detroit was the "Flamingo", built by the Halpin Development Co., Cincinnati, O. It is an all-metal cabin monoplane with a braced wing above the fuselage. The cabin houses five passengers in addition to the pilot, with provision for about 600 lb. of mail, luggage, or express. Powered with a Pratt & Whitney, 400 hp. "Wasp" engine, the Flamingo is stated to have a top speed of 140 m.p.h. and a landing speed of 48 m.p.h. It carries 150 gal. of gasoline, which should be sufficient for a range of 1,000 mi. The covering of the plane is unfinished, except for the tail, which is painted red for decorative purposes.

Only One Plane Built

Only one plane of this type, the "Miss Cincinnati", has been built though it is understood that orders are on hand for many more, and regular production will be under way shortly. The structure of the Flamingo has been simplified so that it will lend itself to large scale production economically. In addition, the construction is such that all parts may be easily inspected, repaired or replaced. The Flamingo is intended for the private owner or commercial operator either as a passenger plane or mail plane. It has ample power, can carry sufficient load and has good performance.

The wing is braced by struts from the lower fuselage longerons to a point at 58 per cent. of the semi-span of the wing. These bracing struts have an airfoil section and are supported laterally by a member between them attached at a point below the wing. In addition, there is a vertical member at this point connecting the lift brace to the wing. The wing itself is of all-metal construction using .014 in. sheet duralumin for covering. This covering, like that of the fuselage, is corrugated intermittently with four inches between each of the half round corrugations. It is claimed that this makes for lighter weight as well as reducing the air resistance by having less surface area than the usual type of corrugations. The corrugations provide the necessary strength to take local loads and withstand vibration. The covering is removable in panels to facilitate inspection or repair.

Internally, the members of the wing structure are conventional in shape, with all parts of metal; open sections are

Rear quarter view of the Halpin "Flamingo".

used wherever possible. The spars are of I section built up of a vertical sheet for the web with extruded duralumin angles riveted to it for the flanges. The web is solid, with simple steel fittings riveted to it. As the wing has the same section throughout, the ribs are all alike. There are 28 ribs, all of sheet duralumin with flanged lightening holes and flanged edges. They are built in three parts: the leading edge, center portion, and trailing edge; thus, they may be blanked out more cheaply than if they were all in one piece. In addition, as the wing may be put together in units, assembly costs are reduced. Compression members between the spars are of steel tubing with end fittings to take drag wires. The wing is divided into three bays with bracing only in the inner two bays. The outer bay utilizes the skin to take the

Continued on page 1241

The Halpin "Flamingo" all-metal cabin monoplane powered with a Pratt & Whitney "Wasp" engine.

The Detroit S.A.E. Meeting

Two Day Aeronautical Session Included Visits to Local Factories, a Banquet, and a Discussion on Standardization of Parts

IN CONJUNCTION with the All-American Aircraft Show, the Detroit Section of the S.A.E., held a two day aeronautical session which began on April 17, with a visit to the Ford Airport and the Stout Metal Plane factory. Those who had previously visited the factory were much impressed by the progress made. Production work is being concentrated on the construction of the three engined planes which are being produced at the rate of one a week. A large amount of new machinery, mainly presses, breaks and section drawing machines have been installed, but the greatest progress has apparently been in the detailed design and in the shop practice. Detailed refinements and improvement is making the construction of these giant air liners much more simple. The engineers and their friends were shown around the airport, and the functioning of the air lines and the passenger sight-seeing flights explained to them. In the afternoon the S.A.E. Section visited the Aircraft Show.

The day was brought to a crowded climax with a banquet at the Book-Cadillac Hotel. Four hundred and thirty S.A.E. members and their guests attended the dinner.

The guests of honor were Edward P. Warner, assistant secretary of Navy for aeronautics and Prof. Alexander Klemin of the Guggenheim School of Aeronautics, New York University.

Meeting Addrsed by Professor Klemin

An explanation and justification by Professor Klemin of the rules and conditions governing the $100,000 Guggenheim Safe Commercial Airplane Competition was the educational feature of the meeting. But entertainment was first supplied in generous measure, principally in the form, or rather forms, of several clever and easy-to-gaze-upon dancing girls. While this part of the entertainment was received with loud acclaim, a pilot recently returned from the nearby city of Windsor, Canada, was heard to say that he failed to see in what manner the young women referred to were contributing to the safety of aviation. And even Professor Klemin later found occasion to mention the dancers as excellent examples of streamline forms.

Assistant Secretary Warner found things of interest to say about technical progress which has been made in aviation during recent years and of the stimulus to further progress the Safe Commercial Airplane Competition offered to engineers. He introduced Professor Klemin as his old boss referring, it was inferred, to the pre-war days when Klemin was professor and Warner assistant professor of aeronautics at Massachusetts Institute of Technology.

The performance required of the hypothetically safe airplane—take off, rate of climb, high and low speeds, stall, ground run, as well as detailed explanation of the obstacles to be overcome in attaining the desired results—was thoroughly gone into by the speaker. The rules of the Competition and recent articles by Professor Klemin suggesting technical devices and design features, which may be helpful to engineers competing, have been published in AVIATION.

It is possible with brakes, the speaker contended, to stop a plane within the prescribed 100 ft. Improvement in shock absorbing devices would, he suggested, permit of safe squash landings. The intricacies of wing slots and flaps were gone into. In stressing his points Professor Klemin frequently turned to face Bill Stout, Ivan R. Driggs, Bill Naylor and other airplane engineers who were seated at the speakers' table. He seemed to have something to sell to these men. The impression made upon them was not evident from their interested but non-committal expressions.

Officers of the Aviation Division, Detroit Section S.A.E., were individually introduced to the audience. They were Capt. L. M. Woolson, aeronautical engineer, Packard Motor Car Co., Ralph Upson, widely recognized lighter-than-air designer and engineer, W. C. Naylor, chief engineer of the Stinson Aircraft Corp., William B. Stout, engineer and head of the Metal Plane Division, Ford Motor Co., Ivan R. Driggs, engineer and vice president Driggs Aircraft Co., and Jack Whitaker, much air-travelled aviation engineer of the Tidewater Oil Co.

Others introduced to the diners were Lieut. Walter Hinton, famed pilot of the NC-4 in the first Atlantic crossing by air; B. Russell Shaw, airport engineer, who has the difficult assignment of selecting and purchasing a site for Detroit's airport; Lieut. Walter Lees, who taught Gen. William Mitchell to fly and is one of the charter members of the Caten, pillar Club, and Glenn L. Martin, oldest American airplane manufacturer (in experience only) now in the business.

Miss Warner, a sister of Assistant Secretary Warner, who has recently soloed, was in the ladies' balcony and was introduced. Miss MacGregor, a Canadian girl pilot, who flew in with Commander Byrd's Ford tri-engined plane sat at the speakers' table and was also introduced.

Engineers Visit Packard Plant

On Wednesday April 18, the engineers spent the morning visiting the plant of the Packard Motor Car Co. Here they were shown the latest Packard developments in aircraft engines including the 24 cylinder X engine which Lieut. Al Williams used in his racing plane. The manufacturing methods used and the extreme care in the selection of material and in the machining of the parts proved of great interest to those who were more accustomed to the manufacture of automobile engines.

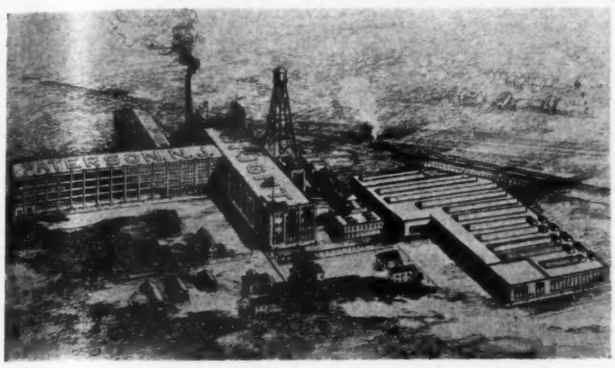
The real business of the Aviation Division of the S.A.E. began in the afternoon. Under the chairmanship of Assistant Secretary Warner the standardization of various aeronautical parts was discussed. This work was started some eight years ago but then allowed to lapse and received no active attention until about two years ago when several sub-committees were appointed to study the standards of uniformity applicable to commercial aeronautical parts. Assistant Secretary

Continued on page 1238

Wright Company Adding Buildings To Meet Demand for Whirlwinds

UNPRECEDENTED INCREASE in orders for Whirlwind engines from military and commercial users throughout the world has necessitated new buildings and plant equipment at an investment of $3,500,000, according to a recent statement by Guy Vaughn, vice president of the Wright Aeronautical Corp. of Paterson, N. J. Under the present plan of operation the new buildings will be completed and ready for occupancy by October 1.

A contract was recently signed for the erection of a four story building adjoining the original home of the Wright company on Lewis St., Paterson. This structure will contain 100,000 sq. ft. of manufacturing floor space. The first, second,



How the new home of the Wright Aeronautical Corp. of Paterson, N. J., will look when completed in October of this year.

and third floors will contain machine tools and new equipment for the production of the "J" series of engines. The fourth or top floor will be used as an office for executives, sales, and engineering personnel now housed in temporary quarters apart from the main plant. The basement of the structure is to be occupied by a cafeteria, hospital, and employment department for the entire personnel of the Wright company. Construction work has already been practically completed on a separate assembly and test plant containing 60,000 sq. ft. of floor space. This new building, one story in height, will be used by the assembly, test, service, and shipping departments.

During 1927 and the early part of 1928 the Wright company increased production until 90 engines a month were turned out. With the new assembly plant in operation, approximately 180 engines will be produced a month; and with the four story building completed, some 500 "J" type aircraft engines will be manufactured, it is claimed, each month.

New Personnel to be 2000

The original four story Wright plant on Lewis Street containing 90,000 sq. ft. and representing an investment of about $325,000, will be reconstructed under the new manufacturing plan so that each department will have ample room for additional expansion as time goes on. With the increase in plant facilities, it will be necessary to add to the number of employees. The present quota of 1200 will be increased to more than 2000.

The Wright Aeronautical Corp. was formed in 1919 to take over the business of the Wright-Martin Aircraft Corp., and in 1920 it moved to Lewis Street. At that time, the concern was producing eight and 12 cylinder water cooled aviation engines. In the fall of 1923, the Lawrance Aero Corp. and the Wright company joined to continue business under the Wright name. Successful development of the popular J-5 Whirlwind power plant followed later under the supervision of Mr. Lawrance and the encouragement of Army and Navy officials.

Travel Air Mfg. Co. Brings Out New Cabin Monoplane Type 6000

THE TRAVEL Air Mfg. Co., Wichita, Kan., recently completed a cabin monoplane that is to be produced under the designation "Type 6000." Though the wing is somewhat smaller than the previous Travel Air monoplane, Type 5000, the fuselage is essentially the same. Type 6000 is somewhat heavier and carries a greater load. It weighs 2,350 lb. empty and has a useful load of 1,650 lb. making the gross weight 4,000 lb. It is a braced wing type powered with a Wright Whirlwind engine. The cabin has places for four passengers and 150 lb. of baggage or pilot and 1,000 lb. of baggage.

The cabin is richly upholstered in blue velour with four removable wicker seats in the rear. The pilots' seats are in front fitted with dual side by side Dep. control, the interior is well lighted and well ventilated, and the windows extend the length of the cabin and are opened by cranks on the cabin walls. The pilot has excellent vision, though he sits somewhat lower than on the previous Travel Air monoplane designs.

Externally, the plane presents a good streamline appearance. The fuselage has straight sides rounded on the corners with the upper surface of the wing coinciding with the top of the fuselage. The wing is supported by two parallel struts on each side. The forward strut supports the compression

New monoplane now in production by Travel Air Manufacturing Co., Wichita, Kan.

member of the landing gear while the other two members hinge about the lower fuselage longeron. The corner between these two members, at the wheel, is faired to reduce the air resistance. Fuel tanks of 78 gal. capacity are placed in the wing roots giving the plane a range of about 700 mi. The high speed is 128 m.p.h. and landing speed 57 m.p.h. It has a climb of 750 f.p.m. and a service ceiling of 15,000 ft.

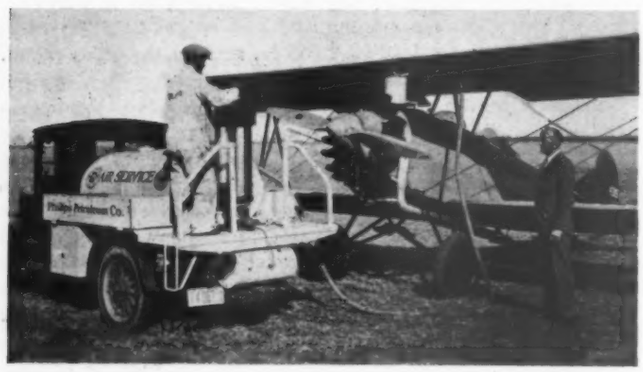
Gates Company of Newark Sells 10 Challenger Planes in 10 Days

METROPOLITAN AREA airplane market strength was recently demonstrated when the Gates Flying Circus & Aviation Corp., Newark, N. J., sold 10 Challenger planes in the first 10 days of its agency for that craft. The territory of the sales was Northern New Jersey and Southern New York including the metropolitan section. The Challenger plane is manufactured by the Kreider-Reisner Aircraft Co., Inc., of Hagerstown, Md.

Traveling Service Station is Used On Travel Air Field, Wichita, Kan.

PILOTS FACED with the necessity of a fast trip to Wichita, Kan., need not wire ahead to get gasoline and oil ready if they intend landing at the Travel Air Flying Field at that city, for a special service car is employed at this airport ready for action the minute a plane lands.

A one ton truck chassis furnishes the power and rolling equipment necessary to make this service station available at all points of the field. Upon the body of the truck is mounted a good sized gasoline storage tank, hand operated gas line



Walter Beach, president of the Travel Air company, watching the new rolling service station in action.

pump, rack for oil containers, compressed air tank with flexible hose connection, storage tank for water to service water cooled engines, a grease gun to lubricate rocker arms, and other contrivances needed to give complete service to planes. Gasoline is pumped through a special funnel using a chamois skin to preclude any possibility of water getting into the tank of the plane. This same funnel has attached to it a long chain which drags on the ground thus obviating possibility of fire from friction aroused by static electricity in adjusting the funnel into the gas tank or in the pumping process. On cold, wintry days when airplane engines are "stiff", this same truck serves hot lubricating oils to warm up the engines.

Charles Miller Named Production Head of Miller Airplane Products

LESLIE MILLER has announced the appointment of Charles Miller as production manager of Miller Airplane Products, Inc., of Los Angeles. With the addition of Mr. Miller to the staff of employees now engaged in producing OX-5 overhead and repair sets there is some prospect that the factory may soon be able to catch up with the flood of orders which has caused the plant to treble its equipment and employees in the past 60 days.

Although Leslie Miller has acquired 3000 sq. ft. more floor space, installed $9,000 worth of new machinery, and worked a night shift in addition to the regular force, he reports that he is still two weeks behind on shipments. Production has now reached such a pace, however, that he hopes within the next month to be able to ship the same day an order is received.

It is also reported that a new air cooled engine will be placed on the market next spring by Miller Airplane Products. This engine has been designed for great simplicity and durability and will be built in large quantities to sell at a low price.

Alexander Production Delayed Only Three Days by Fire

CONTRARY TO newspaper reports the recent fire that razed the doping and wing covering building belonging to the Alexander Aircraft Co., Denver, Col., destroyed only 15 sets of Eaglerock wings. The equipment is being replaced at once and the output of completed planes will only be delayed about three days.

The above information was supplied to AVIATION by E. S. Winship, sales manager of the Alexander Company.

Quick Motors Co. Now Producing A Nine Cylinder Air Cooled Engine

THE QUICK Motors Co., Wichita, Kan., is in production on the Quick radial engine, a Rhone engine rebuilt into a static design. It is a nine cylinder, air cooled with bore of 4.13 in. and stroke of 5.51 in. giving a displacement of 667 cu. in.

The compression ratio is 5 to 1. Dynamometer tests have been made on the engine and it has been shown to develop 125 hp. at 1450 r.p.m. The engine weighs 325 lb. or 2.6 lb. per hp. The manufacturer states that the fuel consumption is eight gallons per hour and oil consumption ½ to ¾ gal. per hr. The engine sells for $1750 with dual ignition including Scintilla magneto, Champion spark plugs, and Zenith carburetor.

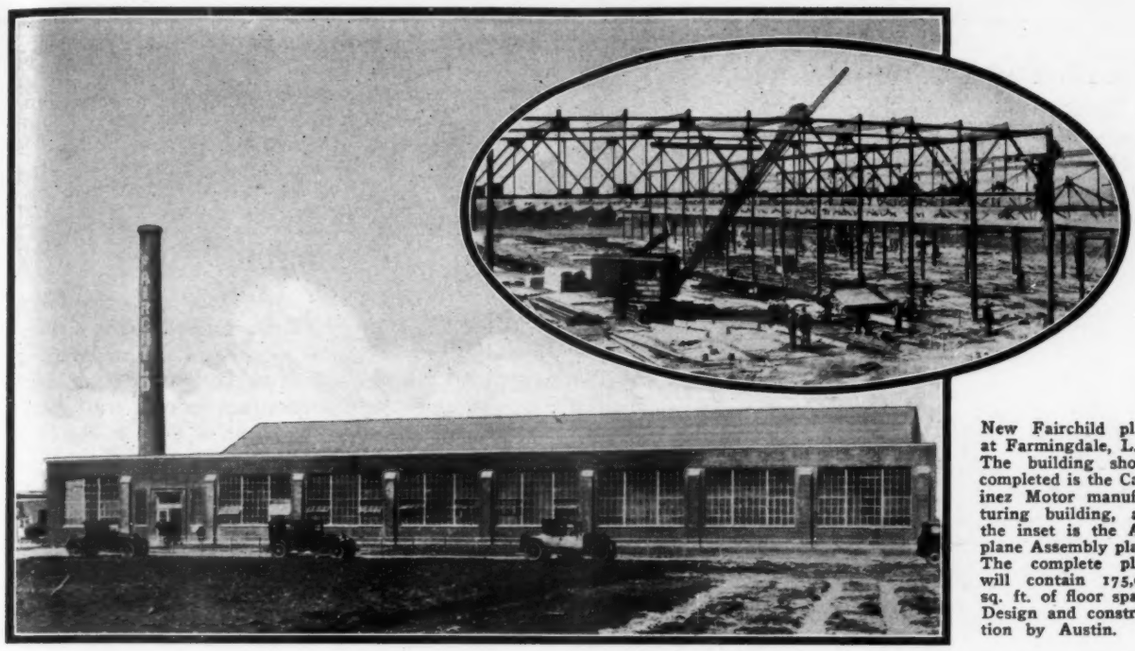
A Quick radial engine was installed in an American Eagle biplane and with this power plant it has a high speed of 115 m.p.h. and a cruising speed of 95 m.p.h. It climbs 1,000 f.p.m.

Commercial Aircraft Manufacturers Hold Meeting at the Detroit Show

THE SECOND meeting of the commercial aircraft manufacturers' branch of the Aeronautical Chamber of Commerce was held in Detroit on April 19 and 20. This was during the week of the All-American Aircraft Show which had gathered the manufacturers together from all parts of the country. The leading builders of commercial aircraft were present but unfortunately many of the smaller manufacturers found themselves so busy with their duties in connection with the Show that they were unable to attend the full conference. The subjects discussed were to a considerable degree the same as those which had been talked over at Wichita during the first conference and had to do with sales policies, dealer organizations, etc. A fuller account of the meetings will be given in next week's issue.

New Valley Air Service in Oregon Is Distributor of American Eagles

THE VALLEY Air Service has been organized to operate a flying school and general air service at Forest Grove, Ore. It has ordered four American Eagle commercial biplanes through the Mackenzie-Goff Aviation Co. of Portland, Ore., and has been appointed distributor for that plane in three neighboring counties. Members of the company are J. P. Livermore, C. L. Burlingham, and William Forbes. Livermore is chief pilot.



New Fairchild plant at Farmingdale, L. I. The building shown completed is the Caminez Motor manufacturing building, and the inset is the Airplane Assembly plant. The complete plant will contain 175,000 sq. ft. of floor space. Design and construction by Austin.

A Complete Engineering and Building Service for the Aviation Industry

DURING the past 10 years Austin has designed and built more than 2 million square feet of floor space for the Aviation Industry.

Among Austin clients are such names as Boeing, Fairchild, Curtiss, Pratt & Whitney, U. S. Navy, U. S. Army, Ford National Air Transport, and Glenn L. Martin. These contracts cover work in fifteen cities from Coast to Coast and from Canada to the Gulf, including also some points abroad. Four projects now under way total one-quarter million square feet of floor space.

No project is too large or too small for Austin engineers regardless of the type — hangar, factory or other structures — 5,000 or 1,000,000 square feet — Austin experience and facilities are at your disposal at all parts of the country.

Austin will design, build and equip complete; or will provide complete plans and specifications, and delivery of steel and other essential building materials for erection by you, or a local builder.

Austin guarantees in advance low total cost, completion date with bonus and penalty clause if desired, and high quality of materials and workmanship throughout. Approximate costs and other information will be furnished promptly. Phone the nearest office, wire or send the memo below.

THE AUSTIN COMPANY Engineers and Builders to the Aviation Industry — **Cleveland**

New York Cincinnati Chicago Detroit Pittsburgh Philadelphia St. Louis Seattle Portland The Austin Co. of Texas: Dallas The Austin Co. of California: Los Angeles and San Francisco

AUSTIN

Complete Building Service

Memo to THE AUSTIN COMPANY *Cleveland*— We are interested in a .....project containing.....sq. ft. Send me a personal copy of

☐ "Austin Builds for Aviation."
☐ "The Austin Book of Buildings." Individual.....

Firm.....City.....

A 4-30-28

THANK YOU *for mentioning* AVIATION

C. H. Holmes Named to Sales and Advertising Position with Prudden

C. H. HOLMES, who for more than five years has been interested in aviation in California, has been appointed assistant director of sales and general advertising manager for the Prudden-San Diego Airplane Co., according to an announcement made by George H. Prudden, head of the concern.

C. H. Holmes, new assistant director of sales and general advertising manager of the Prudden company.

In addition to his aviation experience, Mr. Holmes brings to the Prudden-San Diego Airplane Co. a knowledge of advertising gained from many years work in this field of effort. He has been associated with many of the leading advertising concerns of Southern California, but of late has directed his efforts toward aviation, both from the sales and advertising angle.

In taking over his new duties Mr. Holmes announced that he would seek to adopt, and carry out, many new novel features in his future advertising programs.

"Continuity of any one definite scheme, and particularly one outstanding word, which will create in the mind of the reader a swift impression of the subject involved, is an important factor in successful advertising," Mr. Holmes declared. Together with A. J. Edwards, who is sales director of the Prudden-San Diego Airplane Co., Mr. Holmes will carry forward the new program of sales helps formulated by the officials of the concern. The Prudden company manufactures an eight place, dual control, tri-engined metal monoplane.

Stout Air Service Will Operate Detroit-Chicago Passenger Line

PASSENGER AIRPLANE service between Detroit and Chicago, operating on a regular schedule and using three-engined Ford monoplanes, which have been used on the Detroit-Cleveland line, was recently announced by the Stout Air Service, Inc., of Detroit. The announcement was made on the third anniversary of the Ford Motor Co. into the commercial airline field.

The Detroit-Chicago line, it was said, really is an extension of the Detroit-Cleveland line. A third division between Cleveland and Chicago will be put into operation later, making a triangular passenger service between the three cities. Both morning and afternoon departures from each of the cities is planned, according to the announcement.

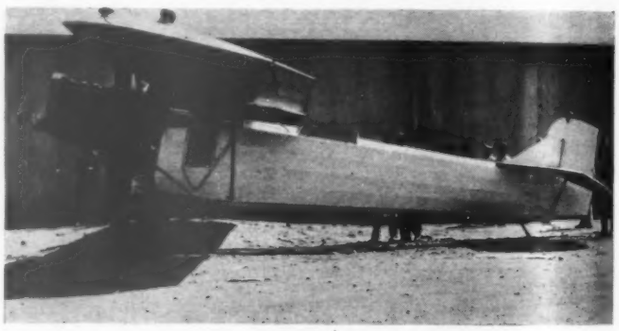
Although the schedules have not been worked out it is planned that a plane will depart from Ford Airport, Detroit, about 9 A.M. and will leave Chicago on the return trip about 4 P.M. The scheduled flying time will be 2 hr. 30 min., thus enabling Detroit business men to have approximately four hours to transact business in Chicago. A similarly arranged schedule is now in operation on the line between Detroit and Cleveland. The Chicago line will be so scheduled, Stout officials say, that timely connections may be made with planes operating out of Chicago for St. Paul, Kansas City, Salt Lake, and Los Angeles. The new division will begin operation as soon as additional equipment can be obtained.

Two New Mexican Designed Planes Built in Tijuana, Lower California

TWO MONOPLANES, the first of which was completed late in March, are to be flown from Tijuana, Lower California, to Mexico City this spring. These airplanes, representing the first serious effort on the part of the Mexican Government to design and construct its own craft, were built by the Tijuana Aircraft Co. of which Gov. Abelardo Rodriguez of Lower California is head. They were constructed from plans furnished by the Mexican War Department and adapted by William Waterhouse, Los Angeles designer.

The first plane is all metal except for the linen covering on wings and fuselage. It has a gasoline capacity of 90 gal. The second plane will carry a fuel supply of 350 gal., 90 gal. in two wing tanks and 240 gal. in a large fuselage tank. This plane has a span of 41 ft. 6 in. and weighs 2,505 lb. with pilot and fuel. A Story wooden propeller is used which is 9 ft. 4 in. in length and 5 ft. 6 in. in pitch.

In test flights, a six cylinder German engine, said to be of the B.M.W. type, was used. This power plant develops 185



One of the new Mexican monoplanes completed but for the engine cowling.

hp. at an 8,000 ft. altitude and weighs 600 lb. installed. For flights to Mexico City, however, it is planned to use the Whirlwind engine.

The first plane will be delivered to the technical university at Mexico City for further experimental work. This type, if successful, will be used by the Mexican Army and Mexican air mail service. Capt. Louis Farrel, one of Mexico's most experienced fliers and a former Kelly and Brooks Field student, will fly both planes to Mexico City, taking the first through with stops at Mexicali, Sonoro, Manzatlan, and Jalico. Following this flight he will return to Tijuana, attempt a non-stop flight to Mexico City in the second plane, and later a non-stop flight to New York.

Minnesota's Northwest Aircraft Show is Postponed to May 24-26

ANNOUNCEMENT HAS been made that the Northwest Aircraft Show, which was to be held at the St. Paul Airport April 26-28, has been postponed to May 24-26. The Wold-Chamberlain Field in Minneapolis, furthermore, will be the scene of the show rather than the St. Paul Airport because filling and dredging will be under way at the latter field at the time of the exposition.

The Detroit Exhibition saw and approved this new Bowser System for the quicker and more convenient fueling of airplanes.

The Bowser "service pit" for complete servicing of aircraft. Gasoline deliveries, 18-20 gallons per minute. Sturdy. Installed level with ground. Taxi plane up to "service pit," or near it—no parts project above ground except when plane is being fueled. Water-tight when closed. Accurate check on *all* gasoline and oil servicing, through "Xacto" Meters. All switches for remote control are vapor-proof.

SPEED is the underlying reason for airplanes today—to get things done faster—mail, express, freight, and passengers.

So, to help aviation do its job more efficiently, quicker, and more economically, Bowser has designed and made a complete system for servicing planes in airport. Gasoline, oil, water, and air are all provided for.

The servicing point of the system is an all-steel "service pit," installed at any convenient point on the field. This pit has in it a 50-foot hose for gas, and if other services are desired, the same length for oil, water, and air. Hence, planes are served anywhere within 50 feet of the pit.

Exact measurement of liquids is by "Xacto" Meter—the most accurate pipe line measuring device for liquids ever produced.

Pumping equipment is installed in the hangar, and control of delivery is at the end of the hose.

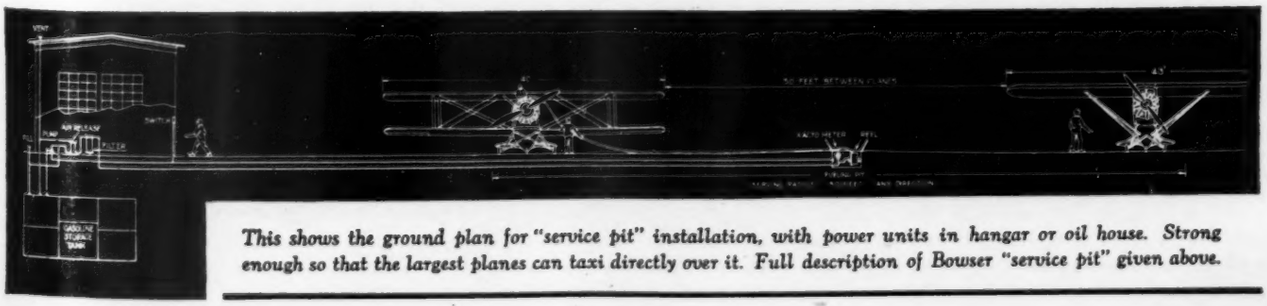
One of our fueling experts will be glad to call on you, and show you how your planes can be easily, quickly, and efficiently handled. Your inquiry is invited.

S. F. BOWSER & COMPANY, Inc.

COMPLETE SYSTEMS FOR FUELING AIRPLANES IN PORT

1308 Creighton Avenue

FORT WAYNE, INDIANA, U.S.A.



This shows the ground plan for "service pit" installation, with power units in hangar or oil house. Strong enough so that the largest planes can taxi directly over it. Full description of Bowser "service pit" given above.

License Requirements More Strict In New Air Commerce Regulations

NEW AMENDMENTS to Air Commerce Regulations, effective June 1, have been announced by the Department of Commerce, with greater flying safety the outstanding motive of the rulings. Increased license requirements for both pilots and aircraft and stricter flying regulations are the chief changes.

Under the new rules a licensed instructor must have 200 hr. solo flying compared with the former 50. Private pilots also must meet additional tests. They must show 10 hr. actual solo flying experience, whereas formerly such licenses were granted on satisfactory demonstration of flying ability.

Aeronautical knowledge tests are also made more stringent. Examinations in separate subjects to pilots and mechanics must each be passed with a grade of 70 per cent., instead of the former average of 70 per cent. Examinations for industrial pilots now include primary tests in elementary engine and plane mechanics and rigging, and on Air Commerce Regulations in addition to the air traffic rules as hitherto requested.

Practical experience requirements are raised for mechanics' licenses. Engine mechanics must have, instead of a former "sufficient knowledge", at least two years' actual experience on internal combustion engines. Examinations on that portion of the Air Commerce Regulations pertaining to the operation and inspection of aircraft must also be passed successfully, and mechanics must show that they have a sufficient knowledge of aircraft engines, their accessories, including ignition systems, inspection, maintenance, repair, and overhaul.

Passengers Must Be Sober

Flying itself is also more strictly regulated by the new amendments. The carriage of explosives other than fuel in planes is prohibited. Passengers under the effect of liquor or habit-forming drugs are not permitted to be taken up by a licensed pilot. Formerly the requirement covered only the pilot.

Other sections of the new amendments prohibit acrobatic maneuvers at less than 1,500 ft., and taking off or landing on any public street or highway under ordinary circumstances without the consent of the local governing authority and the approval of the Sectretary of Commerce.

Additional clauses have been added to the section of the Air Commerce Regulations pertaining to revocation and suspension of license. The new rules consider any false statement in a license application grounds for revocation or suspension. Furthermore, all licensed planes are required to carry certain data stencilled on the side of the plane nearest the passenger's entrance. Permission is given for planes which have been issued an approved type certificate to carry an insignia indicating this approval, in order to inform the public that the plane is of a type approved by the Department.

Another new section adds "before any license is renewed the Secretary of Commerce may in his discretion require the holder of such license to undergo any of the theoretical or practical tests prescribed as requisites for the original license."

George Miller Becomes Student Instructor at the Dycer Field

GEORGE MILLER, well known Southern California pilot and instructor, has accepted the position of student instructor at Dycer's Airport, Los Angeles. Miller will include the elements of navigation and meteorology in his course. The present enrollment at the field is 85.

Navy Tests Vought Corsairs Fitted With Amphibian Type Landing Gear

THREE VOUGHT Corsairs, fitted with experimental amphibian type landing gears, are undergoing service tests in the maneuvers of the Pacific Fleet of the U. S. Navy. The planes are standard Vought O2U biplanes powered with Pratt & Whitney Wasp engines. The seaplane installation resembles that of the standard service type with a single main float and wing tip floats. The main float is fitted with retractable landing wheels for land or aircraft carrier operations.

Two of the installations were made at the Naval Aircraft Factory, Philadelphia, Penna., while the other was made at the factory of the Chance Vought Corp., Long Island City, N. Y. The design effected at the Naval Aircraft Factory was made with the permission of the Loening Aeronautical Engineering Corp., New York City. This closely resembles the landing gear of the standard Loening amphibian. The wheels rotate about the chine of the float with the shock absorbing member set into an opening in the float. The wheel is retracted into the float with only part of the wheel and

One of the Vought Corsairs fitted with experimental amphibian landing gear.

tire showing. The wheel on the Vought installation does not retract into the float but is merely raised clear of the water. It has been stated that these planes are 20 m.p.h. faster than any service type of amphibian. In addition, they can be catapulted much easier than a flying boat.

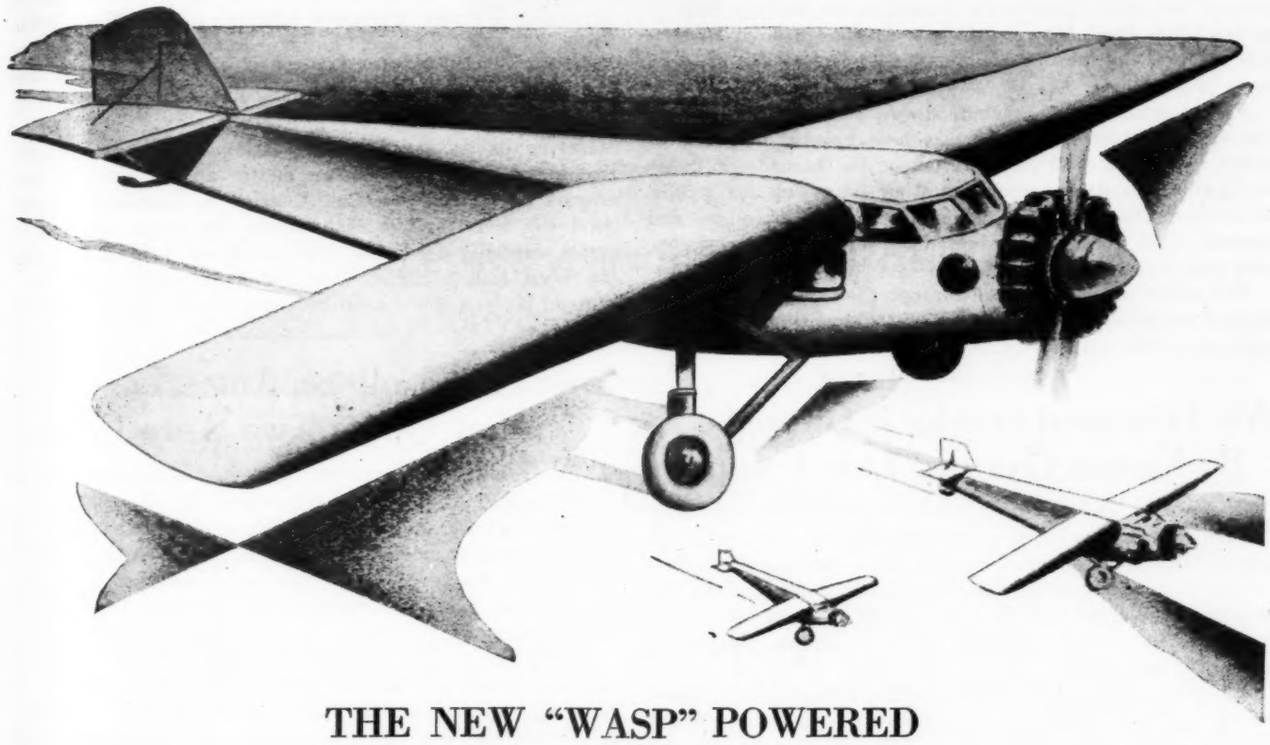
Los Angeles Times Begins Regular Aerial Delivery of Morning Papers

SAID TO be the first paper in the world to arrange for regular distribution of copies by airplane, the Los Angeles Times is sending the 2 A.M. edition to San Francisco and mid points for an experimental period of time to discover the value to the newspaper of such a practice.

The service used is supplied by the three engined Fokker monoplane operated by Western Air Express. This plane now leaves Vail Field, Los Angeles, each morning shortly after 2 A.M. with its load of papers. The flight to San Francisco is made in approximately 4 hr. 34 min. If this method of distribution sufficiently increases the northern circulation of The Times the delivery of papers by plane will be widely extended.

The bundles of papers have long streamers attached to them and delivery at way points is made by flying low over the field of the town to which delivery is made and kicking the bundles overboard as the plane passes above the field.

THE HIT OF THE SHOW



THE NEW "WASP" POWERED HAMILTON METALPLANE

AGAIN the Hamilton Metalplane has exceeded all expectations. It was the hit of the show. Its advanced design and construction — its wonderful record of efficient performance struck the keynote of aircraft progress. Those who saw it were impressed with its sturdy, durable, all-metal construction. They were delighted with the comfort and luxury of its great enclosed cabin — furnished like a beautiful enclosed motor car — Fire-proof and weather-proof.

The New Hamilton Metalplane, powered by the Pratt & Whitney "Wasp", expresses a wholly new idea in modern economical air transportation. It has brought new comfort, safety and reliability into commercial aviation. The New Hamilton Metalplane has unusual speed to meet every present-day demand. It has power always in reserve and the stamina so necessary to stand the strain of mile after mile of steady flying.

To compare the New Hamilton Metalplane with other planes of similar size and capacity, for low cost of upkeep, for maneuverability and economy, for speed and reliability is to realize at once that it is — the plane of tomorrow. Its popularity was a clear and unmistakable reflection of the value that is built into it.

HAMILTON METALPLANE COMPANY
MILWAUKEE, WISCONSIN

THANK YOU *for mentioning* AVIATION

Little Rock Aero Club to Stage Flying Circus on Sunday May 6

A FLYING circus is to be staged by the Flying Razorback Club of Little Rock, Ark., whose members are enlisted men of the 154th Observation Squadron, on Sunday, May 6, at the Little Rock Intermediate Air Depot. The circus date directly precedes the Confederate Reunion to be held in Little Rock this year.

Flying exhibitions, parachute drops, etc., will be given at the circus, but every care, it has been pointed out, will be taken to eliminate all exaggeration of the hazards of flying with which overly-dangerous stunting impresses the public. A demonstration of radio communication between plane and ground, close formation flying, drop testing of parachutes, and such events will be offered.

The circus is to be financed through the sale of souvenirs—winged razorback pigs—and through the operation of refreshment and other concessions.

Air Transport Service is Offered By Kansas City Bus Line Company

AIRPLANE TRANSPORT service is now being offered by the Ni-Sun Bus Lines of Kansas City, Mo., formal opening in the new field having recently been announced by Walter A. Nisu, president of the company. Passenger plane service out of Kansas City to any part of the country is now available, but regular schedules, states Mr. Nisun, will not be attempted until later.

When not operating on distant flights, the company's planes will be used for sightseeing and taxi service at the local field. The charges on long flights will be $.35 per mile for one passenger, $.17½ for two passengers, and $.16⅔ for three persons, and $.12½ for four.

Boeing Planes to Have Special Air Speed Indicators For Passengers

PASSENGERS CARRIED in the large Boeing transport planes between Chicago and San Francisco will soon be able to note, without stirring from their seats, just how fast the plane is traveling. Large air speed indicators six inches in diameter and registering up to 160 m.p.h. will be installed in the cabin of each airplane, it has been announced. The speed indicators will be manufactured by the Pioneer Instrument Co. of Brooklyn, N. Y.

"Pathfinder" Plane Flies 393 Hr. Without Need of Major Repairs

A RECORD of 393 hr. in the air without a major repair or engine overhaul, has been made by the "Pathfinder", a large three-engined transport biplane, in the West Indian Express Service between Santiago de Cuba, Port au Prince, Haiti, San Juan, Porto Rico, and Santo Domingo City. The Pathfinder is manufactured by the Keystone Aircraft Corp. of Bristol, Penna.

During its six months of operation, the biplane has carried tons of mail and express matter and hundreds of passengers in safety. On Col. Charles A. Lindbergh's recent good will tour through that section, the plane acted as his escort, carrying a considerable portion of his following over the West Indian route. The Pathfinder is the first three-engined biplane commercial transport to be built in America.

Iowa State College, Ames, Ia., Now Offers Two Aero Courses

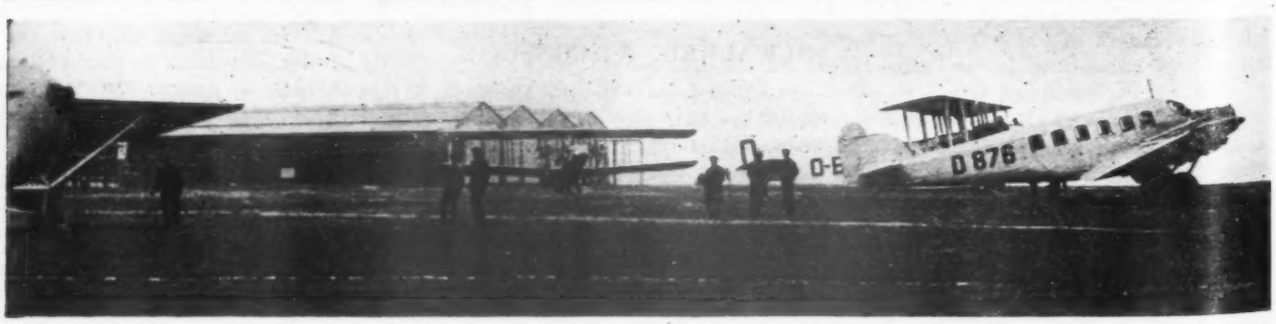
TWO COURSES in aviation have just been started in the Mechanical Engineering Department of Iowa State College, Ames, Iowa, under the direction of Prof. Earl B. Smith.

One course is commercial aviation, a non-technical course giving the fundamentals of air transportation, economics, organization, laws and regulations, insurance, types of aircraft, airports and airways, and navigation. Another course —Aerodynamics and Airplane Design— is given for senior engineering and graduate students. This course includes the technical and engineering phases of the subject. A number of planes, engines, and other items of aviation equipment have been received from the surplus stock of the Government for use in instruction.

Form Two New Airport Companies In Lake Front Cities of Wisconsin

TWO NEW airport companies were recently incorporated in Wisconsin, according to reports. One, the Southern Wisconsin Airways, Inc., of Kenosha, has been formed by Walter J. Kaufman, E. Hedeen, and H. L. Kaufman; the other, the Sheboygan Airport Co., was incorporated by C. F. Pratt, A. W. Sommer, and G. W. Buchen. Both cities lie on Lake Michigan, Sheboygan being north of Milwaukee and Kenosha south of that city.

Where Planes of the Nations Meet



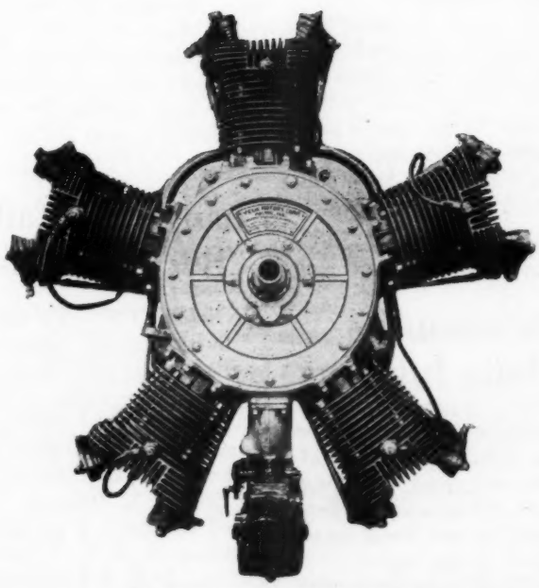
Evere Airdrome at Brussels, Belgium, which is the daily rendezvous of international air liners from England, France, Germany, Belgium, The Netherlands, and other continental countries. The photo shows, from left to right, a French monoplane, a Belgian biplane, a Handley-Page from England, and a large German monoplane.

FOR 20 successive years the name VELIE has been a synonym for quality and superior performance. Highest quality materials, skilled workmanship and mechanical excellence insure ruggedness with extreme lightness.

VELIE MOTORS CORPORATION

MOLINE, ILL., U. S. A.

VELIE



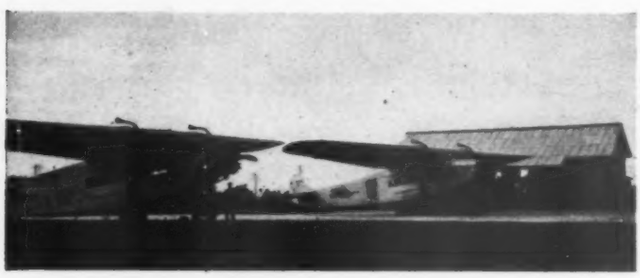
"ASK THE PILOT"

THANK YOU *for mentioning* AVIATION

Key West-Havana Passenger Line Reported to be Highly Successful

PASSENGER AIRPLANE service between Key West, Fla., and Havana, Cuba, which started on Jan. 16 of this year, has been highly successful according to figures released by J. T. Trippe, president of the Pan-American Airways, Inc., of New York, operators of the new line. Information given out shows that a total of 607 passengers were carried from January 16 to April 1—an average of more than 250 a month.

Each plane operated on this line carries a high powered radio set enabling the pilot to know his position and maintain contact with shore bases at all times. In order to better this service, a special radio control station will be placed in operation at Key West October 1. Here a radio operator will be on duty at all times and in continuous touch with planes en route, while a radio beacon will advise the pilot of his position on the course.



The Pan-American Airport at Havana, Cuba.

Phillips-Froberg Company to Open Seattle-British Columbia Service

PASSENGER AIR service, sponsored by the Phillips-Froberg Flying School, is to begin shortly between Seattle, Wash., and British Columbia, according to an announcement by Don S. Phillips, president of the Phillips-Froberg company. Inauguration of the service is held up only by lack of terminal facilities in Seattle, Phillips declares.

Phillips and his associates expect to use a 12 passenger Boeing plane in the new service. It would be powered with three Wasp engines. The service, which is to parallel the route to be followed by the British Columbia Airways, Ltd., which is inaugurating a similar line in May, will be the fourth passenger air line operating out of Seattle, as passengers are now being carried to points south of Seattle by the West Coast Air Transport airplanes and the Pacific Coast Transport planes.

California School of Aeronautics Now Teaches Parachute Jumping

A DEPARTMENT of parachute jumping and wing walking was recently opened by the California School of Aeronautics of Los Angeles, it has been announced. The new department, a branch of the company's flying school, offers training in parachute jumping with packing and handling of the various types of 'chutes fully covered in the course.

The department is in charge of Bob West, a veteran of the flying circus activities. West states that at the present rate of enrollment, jumpers will soon be turned out at a rapid rate.

Montreal-Albany Air Mail Service To be Inaugurated During Spring

AN INTERNATIONAL air mail service between Montreal and Albany, N. Y., is to be inaugurated this spring as soon as navigation opens on the St. Lawrence River, according to the Post Office Department at Ottawa, which has awarded the contract for the carrying of all classes of mail between the two cities.

The contract, involving the sum of $95,900 annually has been let to Canadian Colonial Airways, Ltd., with headquarters at Montreal and is for a service operating four days a week.

Mail steamers will be met at Father Point, Que., by planes of the Canadian Transcontinental Airways, Ltd., with headquarters at Quebec City, and rushed west to Montreal where it will be sorted and trans-shipped for Ottawa, Albany and Toronto.

The service between Montreal and Ottawa will be operated twice a week by Canadian Transcontinental Airways, while that between Montreal and Toronto will be carried on by Canadian Airways, Ltd., of Montreal, making four trips weekly.

The service between Montreal and Albany will be carried on throughout the entire year even after the close of the river navigation. The gain in time on all incoming mail will be slightly better than two days. At Albany connections will be made with the transcontinental service of the United States.

Experiments carried on last summer and during the winter months by the Civil Aviation Branch of the Canadian Air Services have proved very successful. Most of the experimental work has been done by Squadron Leader J. H. Tudhope of Ottawa, who is in charge of air mail routes.

New Dept. of Commerce Bulletin Contains State Aeronautic Laws

INFORMATION BULLETIN No. 41, an abstract of state laws on aeronautics, was recently issued by the Aeronautics Branch of the Department of Commerce, Washington, D. C., and may now be obtained on application. The bulletin gives the text of a proposed uniform state law, then sets forth the aeronautical laws now enforced in the states of Arkansas, Colorado, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, New Jersey, Oregon, Pennsylvania, Wisconsin, and Wyoming.

Announcement is also made by the Aeronautics Branch that a second edition of Information Bulletin No. 4 has been issued. This bulletin lists the various aero clubs and aeronautical organizations in the country.

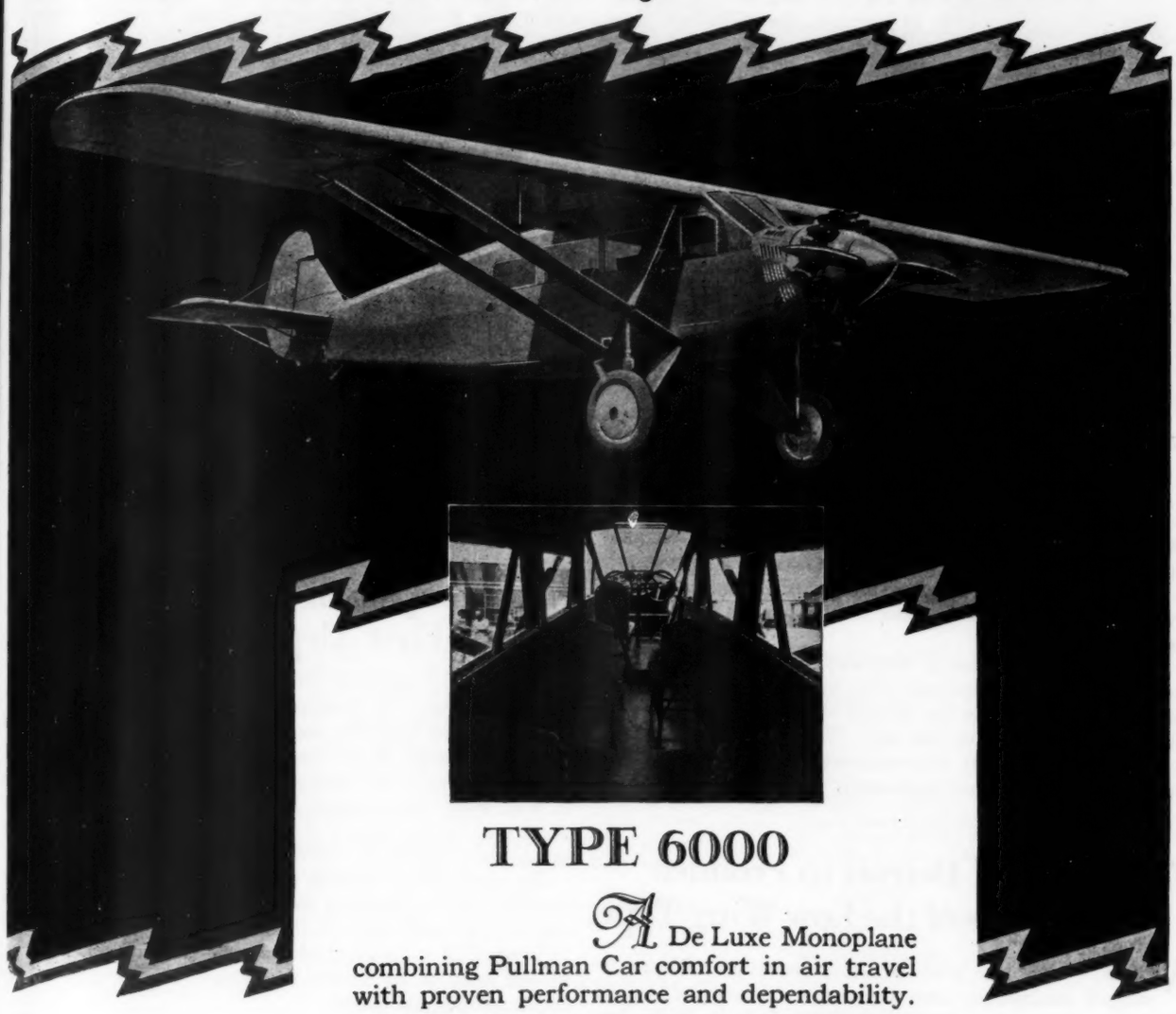
Changes in Staff are Announced By Two Mid-West Flying Schools

ANNOUNCEMENTS OF staff changes were made recently by the Lincoln School of Aviation at Lincoln, Neb., and by the Kansas City Flying School, Kansas City, Mo. George E. Johnson, president of the former company, states that the services of Harold Phillips as director of ground work and repairing, have been secured.

The Kansas City Flying School, on the other hand, announces that L. L. Grismer, the company's chief pilot, has resigned to accept a position on the Pacific Coast. Grismer, according to M. C. Anderson, president of the Kansas City Flying School, has had well over 2,000 hr. in the air during the past five years, most of it in instruction work, and has won many honors in competitive flying.

TRAVEL AIR

The Limousine of Air Travel



TYPE 6000

A De Luxe Monoplane combining Pullman Car comfort in air travel with proven performance and dependability.

CAPACITY—2 pilots, 4 passengers and 150 lbs. baggage, or pilot and 1000 lbs. pay load.

CONTROLS—Duel "dep" (side by side). Separate brake control pedals.

CABIN—All six occupants face forward with full front and side vision. Blue velour upholstering. Four removable wicker chairs. Windows, plate glass, raised and lowered by auto type crank lifts; heater; two full width doors.

LIGHTS—Instrument; navigation. Compartment arranged for landing lights.

POWER PLANT—200 H.P. Whirlwind J5C motor.

PERFORMANCE WITH NORMAL FULL LOAD. High speed; 126 mph. Landing speed, 57 mph. Normal cruising range (78 gal. fuel) 675-725 miles.

Complete specifications and details of equipment on request.

Travel Air Manufacturing Co.

Wichita, Kansas

THANK YOU *for mentioning* AVIATION

R. W. Cramer & Co. is Importing Hasler Tel Aircraft Recorders

R. W. CRAMER & Co., New York City, is importing Hasler Tel Recorders for aircraft. The instrument consists of a Hasler tachometer, revolution counter and clock all connected to a visible recording sheet. During the time that the airplane engine is running, the recording sheet moves at a set speed, and ceases to travel five minutes after the engine stops; thus showing for any time, the speed and total revolutions of the engine. A scriber connected to a clock, marks the sheet. The scriber moves vertically with the time of day and therefore when the engine is stopped makes a vertical line. When the engine is running the sheet moves horizontally causing a sloping line. The upper edge of the sheet is marked in minutes to show the elapsed time that the engine was running. The engine speeds are recorded by another scriber connected with the speed indicator and, any point on the graph represents the engine speed at that instant. Dots on the lower edge of the sheet are recorded every 20,000 revolutions of the crankshaft. Therefore the number of dots multiplied by 20,000 will give the total engine revolutions for each trip. The total engine revolutions, from the time the instrument was installed, is indicated on a revolution counter directly above the dial on the front of the instrument.

The Hasler Tel Recorder.

A device of this nature is very useful for mechanically recording total engine time and time between overhauls. The record will also indicate the time of the plane in the air and the engine speeds during the trip. The complete instrument is carried in a compact case connected to the engine in the same way as the ordinary tachometer.

E. P. Hurd of Detroit to Produce Monoplanes of the Low Wing Type

AFTER OVER two years of experimentation with a low winged monoplane, the Aeronautic Division of E. P. Hurd, manufacturer of locks and chains, Detroit, Mich., has announced that it is now ready to turn these planes out on a production basis. In the fall of 1926 the first plane was designed and built. It was submitted to tests during 1927. Encouraged by the performance during these tests it was recently decided to go into production on this model.

Designed for 60-80 Hp. Engine

The plane is a low wing monoplane designed for a 60-80 hp. engine, such as the LeBlond Sixty, Anzani, or Ryan-Siemens. The first plane was powered with a 60 hp. Air-Cat engine and with this power plant it is said to have a high speed of 100 m.p.h. and a landing speed of 35 m.p.h. It climbs to 3,000 ft. in 5 min. Because of the low wing position and the excessive wing area, to reduce the landing speed, the plane has an exceptionally quick take off making it adaptable for operation in a small field.

The wing is of conventional construction using a high lift airfoil of the Heinkel-Lachman, Gottingen type. The spars are of spruce and the ribs of plywood. The leading edge of the wing is reinforced with sheet aluminum. The wing is attached to the lower fuselage longerons and braced by compression members of plywood and tubing carrying part of the load to the upper longerons.

The fuselage is of welded steel tubing with no wire bracing. It is of rectangular design rounded at the top. The gasoline and oil tanks are of welded sheet aluminum located behind the fire wall and in front of the cockpits. The seats are arranged in tandem with dual control as standard equipment. The passenger seat, in the front, is on the center of gravity so that the balance is not disturbed when no passenger is carried. In addition the horizontal stabilizer is adjustable in flight. The landing gear is of the divided type with 26 in. by 4 in. tires. Provision has been made for the installation of either pontoons or skiis. The tail skid is of the movable leaf spring type.

The following specifications were supplied by the manufacturer:

Span	32 ft. 4 in.
Length, overall	20 ft.
Height, overall	6 ft.
Wing chord	5 ft. 3 in.
Wing area	160 sq. ft.
Weight empty	740 lb.
Disposable load	535 lb.
Gross weight	1275 lb.
High speed	100 m.p.h.
Cruising speed	85 m.p.h.
Landing speed	35 m.p.h.
Normal range	340 mi.

New Company is Formed in Toledo With First Airplane Already Built

E. H. VAN VALKENBERG, designer and pilot, has incorporated the Van Valkenberg Aircraft Co. in Toledo, O., at a capital of $100,000, according to recent announcements. Van Valkenberg's first Toledo plane has already been built and is now ready for trial flights. It is a monoplane of 38 ft. 8 in. span with a fuselage 26 ft. 6 in. in length. The only wood used in the plane's construction is said to be the wing spars, pieces made of routed spruce.

The plane has a capacity of four passengers and has triple controls, two in the front cockpit and one in the rear. It is a cabin type craft but is so designed that unobstructed visibility is reported to be afforded from the rear cockpit, which can be left open if so desired. A Ryan-Siemens nine cylinder engine powers the plane.

Van Valkenberg heads the new company, while G. F. Wagner is secretary. The first plane, the company announces, will be delivered to Dr. Leland E. Phelps of Toledo, who will use it commercially.

Aerial Photo Co. of Oklahoma City Is Formed to Offer Survey Work

AERIAL SURVEY work is now offered by the Aerial Photo Co. of Oklahoma City, a concern recently formed by Clint Johnson and W. E. Bleakley, local aviators. A large aerial camera has been purchased, and photography work will now be done for municipalities and public service organizations throughout the Middle West.

Both Johnson and Bleakley received training at the Government aeronautical school at Austin, Tex. Flying instruction was completed at San Antonio and Fort Sill. A series of pictures for the Daily Oklahoman was the first business done by the new company.

Trustworthy Performance

Trustworthy Performance of the WACO Airplane is the result of years of actual experience in building America's most widely distributed and well known commercial plane.

Trustworthy Performance is the direct cause of the overwhelming demand for WACO Airplanes.

Trustworthy Performance under all conditions of service makes WACO operation profitable.

The choice of four types of motor installation provides WACO Trustworthy Performance for a wide variety of uses.

OX5 - 90 H.P. Ryan-Siemens - 125 H.P. Caminez - 135 H.P. Whirlwind - 200 H.P.

Manufactured under Department of Commerce Type Certificates 11 - 13 - 26

Write the nearest distributor for further information.

CALIFORNIA
Los Angeles—Amn Aircraft Corp.
CONNECTICUT
Hartford—New England Aircraft Corp.
CANADA
London, Ont.—London Air Transport Ltd.
FLORIDA
Orlando—Edgar-Nilson—Harold Muller Co.
GEORGIA
Atlanta—Douglas Davis Flying Service
ILLINOIS
Monmouth—Midwest Airways
INDIANA
Indianapolis—Rollin H. Stewart
Kokomo—Clyde Shockley
KENTUCKY
Lorisville—Cardinal Flyers Inc.
LOUISIANA
Tallulah—Southern Dusting Co.
MICHIGAN
Ypsilanti—Knapp Flying Service
MISSOURI
Kansas City—Tex LaGrone
MONTANA
Great Falls—Vance Flying Service
Dillon—Montana Air Service
NEW YORK
New York City—N. Y. Aircraft Dist., Inc.
Buffalo—Buffalo Aircraft Dist., Inc.
OREGON
Portland—Rankin Flying Service
OHIO
Cincinnati—Embry-Riddle Co.
Akron—Akron Airport Inc.
Youngstown—Bernard Airways Inc.
Steubenville—Tri-State Flying Service
PENNSYLVANIA
Philadelphia—Ludington Exhibition Co.
McKeesport—Clifford Ball
SOUTH CAROLINA
Fort Mill—Elliott Springs—John Crowell
TENNESSEE
Memphis—Midsouth Airways
TEXAS
Austin—University Aerial Service
WISCONSIN
Wausau—Northern Airways, Inc.
WEST VIRGINIA
Wheeling—W. Va. Waco Sales
DISTRICT OF COLUMBIA
Washington—Capitol Airways, Inc.
CUBA
Havana—Alfredo Hornedo

WACO AIRPLANES

The Advance Aircraft Co. TROY OHIO

Minn-Wis-Sippi Airway, Inc., Named Travel Air and Driggs Dart Agent

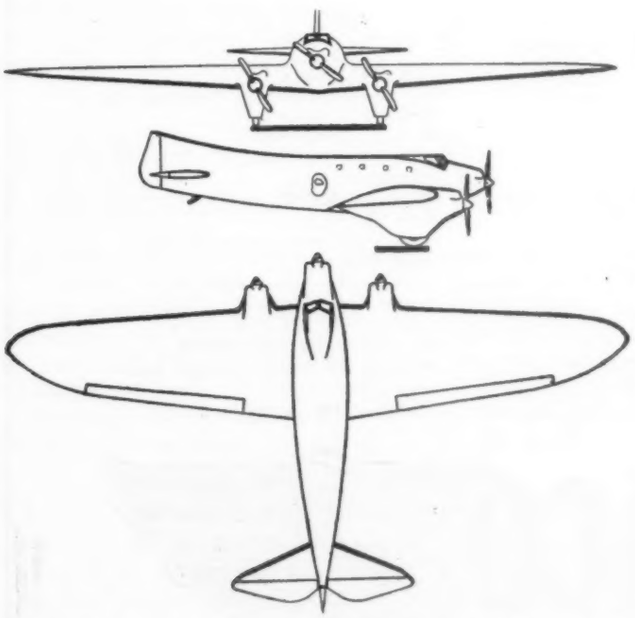
APPOINTED TRAVEL Air Dealer under the Roth-Downs Airways, Inc., of St. Paul, the Minn-Wis-Sippi Airway, Inc., is now operating at Biesanz Field which adjoins the western boundary of the Government field three miles west of Winona, Minn. The company also is agent for the Driggs Dart plane in this Southern Minnesota section, which includes the cities of Red Wing, Owatonna, Lake City, Austin, Albert Lea, Mankato, and Wabasha. The Driggs Dart is a light plane manufactured by the Driggs Aircraft Corp. of Lansing, Mich.

Officers of the Minn-Wis-Sippi company are B. J. Johnson, president and treasurer; George Pelowski, vice president; and Chester Ritt, secretary. In addition to being agent for the two planes named, the company will conduct a passenger and express flying service and sell various aircraft accessories.

Rene Couzinet Constructs Special Three Engined Monoplane in Paris

THE FRENCH designer Rene Couzinet has recently completed in Paris what is apparently a most refined design of three engined plane. As can be seen from the line drawings much ingenuity and skill has been put into blending the engines, wheels and control surfaces into a homogenuously streamlined unit. Tests are now being conducted on the plane and should they be successful the plane will probably make a trans-Atlantic attempt this summer.

The maximum thickness of the wing is a little over three feet and it tapers towards the tip both in plane form and thickness. The spars are of wooden box type construction



Three view drawing of the Couzinet three engined monoplane.

and the wing is veneer covered. The fuselage is also built of wood covered with veneer. An unusual feature is the great height of the fuselage towards the rear permitting the elimination of the vertical fixed stabilizer. The plane is fitted with three 180 hp. Hispano-Suiza engines all of which are accessible while in flight. As can be seen from the specifications table the weight per square foot and per horsepower is quite high when the plane is fully loaded.

Specifications:

Span	89 ft. 1 in.
Length	51 ft. 2 in.
Chord	16 ft. 4 in.
Area	901 sq. ft.
Weight empty	8,580 lb.
Useful load	11,220 lb.
Weight per sq. ft.	19 lb.
Weight per hp.	28.6 lb.
Estimated speed	110-140 m.p.h.

REVIEWS

N.A.C.A. Technical Note No. 280. Drag of Exposed Fittings and Surface Irregularities on Airplane Fuselages by Donald H. Wood.

Measurements were made on fittings taken from a typical fuselage to determine whether the difference between the observed full size fuselage drag could be attributed to the effect of fittings and surface irregularities found on the full size fuselage and not on the model. It was found that there are wide variations in the drag coefficients for different fittings. In general those which protrude little from the surface show very low and almost negligible drag. The measurements show, however, that a large part of the difference between model and full scale test results may be attributed to these fittings.

N.A.C.A. Report No. 281. The Effects of Fuel and Cylinder Gas Densities on the Characteristics of Fuel Sprays for Oil Engines, by Wm. F. Joachim and Edward G. Beardsley.

The start, growth, and cut-off of single fuel sprays produced by automatic injection valves were recorded on photographic film by means of special high-speed motion-picture apparatus. This equipment, which has been described in previous reports, is capable of taking 25 consecutive pictures of the moving spray at the rate of 4,000 per second.

The penetrations of the fuel sprays increased and the cone angles and relative distributions decreased with increase in the specific gravity of the fuel. The density of the gas into which the fuel sprays were injected controlled their penetration. This was the only characteristic of the chamber gas that had a measurable effect upon the fuel sprays. Application of fuel-spray penetration data to the case of an engine, in which the pressure is rising during injection, indicated that fuel sprays may penetrate considerably farther than when injected into a gas at a density equal to that of the gas in an engine cylinder at top center.

Tibbs Flying School of Oklahoma City Named Agent for Eaglerock

AGENCY FOR the Alexander Eaglerock plane for Oklahoma City and the Southwest States has been taken, it has been announced, by the Tibbs Flying School of Oklahoma City. Flying instruction will be offered to plane purchasers and regular students as in the past, states Burrell Tibbs, president of the company.

The Standard Roofing and Materials Co. of Oklahoma City has purchased an Eaglerock to be used in transporting company officials to the various state branches. The Southwest Airways Corp. of Oklahoma City made this sale.

A Center of Interest at the Aircraft Show

THE PITCAIRN SPORT MAILWING

High interest in a sport plane having wide speed range, comfort, and maneuverability was aptly demonstrated by the large number of enthusiasts who inspected the ship at the Detroit All-American Aircraft Show in April.

Except for the conversion of the mail compartment into a separate passenger cockpit and the addition of a baggage compartment behind the pilot's seat, the Sport Mailwing is identical with the Pitcairn PA-5 Mailwing,* duplicating its familiar features of construction and performance. It is powered with the Wright Whirlwind J-5-C engine, and is furnished with the instruments and equipment indicated.

Price, fully equipped at Bryn Athyn, Pa., $9850. Send for illustrated literature and complete specifications. * Reg. U. S. Pat. Office

Instruments

Compass - Altimeter
Air Speed Indicator
Tachometer - Gas Gauge
Oil Pressure Gauge and Thermometer
Clock

Equipment

Navigation Lights
(also wired for landing lights)
Flare Release Mechanism
Fire Extinguisher - Battery
Engine Tools - First Aid Kit

PITCAIRN AIRCRAFT INC.
1864A LAND TITLE BUILDING, PHILADELPHIA, PA.

THANK YOU *for mentioning* AVIATION

Bremen Repaired for Trip to U. S. With Parts Brought by Ford Plane

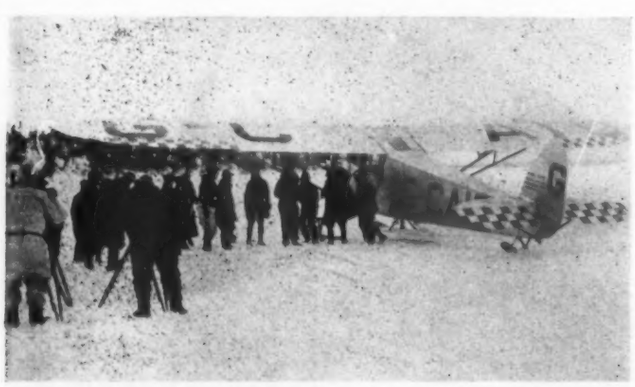
ARRIVAL OF the Junkers monoplane Bremen at Lake St. Agnes, Quebec, is awaited as AVIATION goes to press. The tri-engine Ford relief plane has arrived at Greenely Island, 780 mi. to the northeast, with repair parts for the damaged trans-Atlantic plane, and it is reported that with the cessation of a storm in the region of Greenely Island the repaired Bremen and Ford will fly back bearing Baron Gunther von Huenefeld, Capt. Herman Koehl, and Maj. James Fitzmaurice, the fliers who first crossed the north Atlantic from the East. Ovations await the three in New York City, Washington, D. C., Philadelphia, Chicago, and other centers.

The Ford relief plane flew from Detroit as the All-American Aircraft Show came to a close. After picking up Major

Trussing the damaged Bremen at Greenely Island in preparation for repair work.

Fitzmaurice, who had flown to Murray Bay with Schiller, and Ernest Koeppen, crack Bremen mechanic who followed the fliers across the Atlantic in a liner, the large all-metal plane was flown on to Greenely Island by Bernt Balchen. It carried with it engine tools, repair parts, 60 gal. of Benzol to fuel the Bremen, and general food supplies and equipment.

The first plane to reach Greenely Island to succor the fliers was a Canadian Transcontinental Airways Fairchild cabin monoplane powered with a Pratt & Whitney Wasp engine.



Major Fitzmaurice and Duke Schiller arrive at Seven Islands in the Wasp powered Fairchild cabin plane which first reached the isolated fliers.

This plane was flown through heavy weather by Duke Schiller, who was accompanied by Dr. Louis Cuisinier, technical director of the Canadian company. Schiller, a skilful pilot, met the adverse weather conditions well, soon landing the plane at Greenely. Major Fitzmaurice was then chosen to return in the Fairchild plane to Murray Bay in order to make arrangements for the shipping of repair parts for the Bremen. At Murray Bay, Fitzmaurice was met by Herta Junkers, daughter of the Bremen's designer, who had flown to Canada in the Junkers plane in use at Curtiss Field, L. I., N. Y.

Floyd Bennett, who piloted the "Josephine Ford" over the North Pole for Comdr. Richard E. Byrd in 1926, and Bernt Balchen, who was one of the crew of the Fokker plane "America" which flew the Atlantic last year, brought the Ford relief plane from Detroit to Canada. On arrival in Canada, however, Bennett became seriously ill with pneumonia and had to be removed to a hospital in Quebec. Col. Charles A. Lindbergh has hurriedly flown north with serum for the stricken flier, and Commander Byrd has also left to be at his friend's bedside.

Planes Won Where *Montcalm* Failed

Damages to the landing gear and propeller of the Bremen when it landed on the little barren island between Newfoundland and Labrador on April 13 stopped further progress of the trans-Atlantic fliers until outside aid arrived. It was quickly shown, however, that the fliers' first stop on this continent was an almost incredibly isolated spot, and hence more than a week has been spent in attempting to pierce the stormy section to Greenely Island and bring needed supplies. The steamer *Montcalm* failed to break through the ice of the strait to reach the island, and therefore airplanes have been employed to solve the problem. They have shown their staunchness and worth under the adverse weather conditions encountered.

Gilbert G. Budwing is Named Chief Of Government Inspection Service

GILBERT G. BUDWING, it has been announced by the Aeronautics Branch of the Department of Commerce, has been appointed chief of the inspection service. He will be in charge of airplane and engine inspectors, the examining of pilots and aircraft, the investigation of air accidents, and the enforcing of air traffic rules.

Mr. Budwing replaces Ralph G. Rockwood, who has become associated with the Fairchild Aviation Corp. Formerly one of the early air mail pilots, Budwing has had considerable experience in flying. He was chosen from the ranks of aeronautic inspectors, having been on duty until recently in the North Carolina section.

Chicago and Gulf Airways Plans A Chicago-Mobile Passenger Line

CHICAGO AND Gulf Airways, Inc., a company that will operate a passenger air line between Mobile, Ala., and Chicago, will inaugurate service shortly, it is announced. The company, which is a Mobile concern, plans a 10 hr. schedule between the two cities with a stop en route at Memphis for lunch.

The members of the company are O. A. Coons, Oak Park, Ill., president; A. J. Gibson, Chicago and Mobile, vice president; R. M. Ressler, Los Angeles and Mobile, secretary; J. B. Gibson, Hurley, Miss., treasurer; and John Corville, Pascagoula, Miss. W. G. Taylor, Mobile attorney, is counsel for the corporation.

OX5, OXX6, JN, Canuck Specialists

THESE photos show views of our warehouse, showing vividly the large volume of our stock of material. Note the well-stocked bins, also the accessibility of all parts. Everything in each bin, rack, or pile is carefully listed. This means, that when an order comes in, it is immediately filled. A railroad siding runs right to the door, enabling us to keep our stock replenished in car load lots.

View of our warehouse, showing about half of it.

We are constantly expanding it, by purchase and new production.

Send for Our New 1928 Catalogue No. 6.

In this, we list the most complete line in the country of JN and Canuck plane parts, and OX-5 and OXX-6 motor parts. While we specialize in those items, we also carry a complete line of general utility material, such as dope, fittings, wire, wheels, tires, tubes, shock cord, etc.; everything needed for the plane.

A corner of our warehouse, showing a few of the bins of small parts, and orders in process of being filled.

Everything we sell is high grade war surplus or new production, and our prices are GOOD. We can make them low, due to the large volume of our stock, and the volume of orders we handle annually. We cordially invite you to come in on this now, and by becoming a steady customer, profit by these prices and enable us to lower them still more.

Don't forget — 1928 CATALOGUE No. 6. Send for it — it is free — then use your own judgment.

Another section of the warehouse, showing a new Canuck nearing completion, built up from our large stock. License already granted.

MONUMENTAL AIRCRAFT CO.

Offices
339 St. Paul Terrace,
Baltimore, Md.

Warehouse,
South end of Andre St.,
Baltimore, Md.

Wilkins and Eilson Fly Vega Plane Across Polar Seas to Spitzbergen

A FLIGHT across the world's top, the reverse of that of Amundsen's 1926 journey in the dirigible Norge, was accomplished April 15-16 when Capt. George H. Wilkins, explorer, and Lieut. Carl B. Eilson, pioneer Alaskan flier, flew a Whirlwind powered Lockheed Vega monoplane from Point Barrow, Alaska, to Dead Man's Island, lying 25 mi. north of Green Harbor, Spitzbergen. The trip of 2,200 mi. was made non-stop in 20 hr. 20 min., the line of travel being north from Point Parrow to Grant Land, some 300 mi. to the right of the Pole, then south and east in a line toward Spitzbergen. Discovery of land in the Polar regions to the north of Alaska was the purpose of the trip, but only frozen sea wastes were observed.

Flew on Great Circle Course

The fliers took off from Point Barrow on Sunday April 15 at 10 A.M. after failing thrice to get into the air on previous days because of troubles with the snow-built runway. Alaska behind, the Vega was headed toward Grant Land on a great circle path necessitating frequent changes in course. The altitude averaged 1000 ft., with now and then an ascent to 3000-4000 ft. to cross cloud banks. The average speed was 107-110 m.p.h.

Freedom from menacing weather conditions continued until Wilkins and Eilson suddenly encountered a heavy storm when nearly within sight of their goal, a forced landing on Dead Man's Island resulting. The plane, luckily, was undamaged; and after a five day wait for better weather, the fliers left the uninhabited island, where they had bunked in the Vega's cabin, and flew to Green Harbor, Spitzbergen, on Saturday April 21.

Many Preparations Preceded Flight

Preparations for the flight across the Polar tract were extensive. Finally in readiness, the plane was shipped to Fairbanks, Alaska, then flown to Point Barrow, 500 mi. to the north. Many tests of the plane were made in this icebound and intensely cold section between March 19, the date of arrival, and the take off on April 15 for Spitzbergen.

The Lockheed plane used by Wilkins and Eilson is a stock model with the exception of the extra fuel tanks and ski landing gear. It was built by the Lockheed Aircraft Co. of Los Angeles, Calif. The instruments used in the trans-polar flight included two compasses, one fast and one slow type, two altimeters, a turn and bank indicator, fore and aft inclinometers, an air speed indicator, and others of the usual type. For avigation purposes a large ship's compass, a bubble sextant, a pocket sextant, four special watches, drift indicator, course and distance calculator, nautical almanac, and various special charts and tables were carried. Because the plane is of wooden construction, magnetic disturbances of the compasses were minimized in the flight.

Capt. George Wilkins and Lieut. Carl Eilson standing in front of the Lockheed Vega monoplane in which they flew from Point Barrow, Alaska, to Spitzbergen.

The plane, it is understood, weighed 1,800 lb. empty and 5,200 lb. fully loaded with fuel, oil, and equipment. The combustible load is said to have been 370 gal. of gasoline and 12 gal. of oil. Authoritative figures have not been obtained because the fliers are isolated at Spitzbergen as AVIATION goes to press. The Lockheed Vega was described in detail in the Aug. 22, 1927 issue of AVIATION.

In landing at Green Harbor, the under part of the plane was slightly damaged. With this repaired, the fliers will return to the United States, where preparations will be made, it is said, for a similar South Polar flight. Before returning to America, however, the fliers plan to visit Norway, England, and other European points where arrangements for ovations are being made.

West Coast Correspondent Flies To All-American Show in Detroit

R. G. LANE, Oakland and San Francisco correspondent of AVIATION, flew by Western Air Express from San Francisco to Salt Lake City and by Boeing Air Transport from Salt Lake City to Chicago en route to the All-American Aircraft Show at Detroit. Mr. Lane hoped to secure transportation from Chicago to Detroit by air, but accommodations were not available.

In the flight between Salt Lake City and Chicago, Mr. Lane had as a fellow passenger a Japanese newspaper correspondent now attempting to break the round-the-world travel record.

Mid-Continent Company in Montana Now Distributor of the Travel Air

DISTRIBUTION of the Travel Air planes in the State of Montana has been taken over by the Mid-Continent Aircraft Corp. of Miles City, Mont. First delivery was made recently when the company received an OX-5 Travel Air biplane.

The concern will continue to operate its flying school and offer general commercial service in addition to the sales work. The corporation was organized by Frank Wiley and I. V. Packard and is the outgrowth of the Yellowstone Flying School which began operations last October at the Miles City Airport.

J. M. Johnson is Now Associated With Buhl Company Sales Division

J. M. JOHNSON, a veteran flier, has resigned his position with the Department of Commerce to become associated in a sales capacity with the Buhl Aircraft Co. of Marysville, Mich. Johnson plans to leave shortly on a tour of the country to demonstrate the Buhl plane.

J. M. Johnson was an instructor for Curtiss before the World War. During the war he did test work, and at one time he was president of the Johnson Flying Services in Dayton, O.

Announcing a New Standard of Performance

. . . . . Set by the

PACER

The Airplane Above Par

THE outstanding feature of the PACER Monoplane is its PERFORMANCE, by which it creates a new era in aviation. Truly speaking, the PACER acts as the stepping stone toward better and safer airplanes.

In modern design it stands supreme, embodying advanced features making it the ideal airplane both structurally and aerodynamically.

It's the PACER that sets the pace.

Orders are now being booked for early delivery. Descriptive literature and prices will be gladly sent upon request.

Powered with Hispano Suiza

High Speed	138 m.p.h.
Landing Speed	42 m.p.h.
Climb per min.	1500 f.p.m.
Useful load	1200 lbs.
Fuel capacity	70 gals.

Powered with Wright Whirlwind

High Speed	147 m.p.h.
Landing Speed	42 m.p.h.
Climb per min.	1650 f.p.m.
Useful load	1200 lbs.
Fuel capacity	70 gals.

All instruments as specified by the Dept. of Commerce

Finished with Murphy Aircraft Lacquer

A highly desirable business opportunity will be found in our dealership franchise. Write or wire for further details.

Pacer Aircraft

CORPORATION

Perth Amboy, New Jersey

Factory at Main and Grand Streets, Fords, N. J.

Distributors
Northern New York
Western Penn.
Troy Flying Service
Troy, N. Y.

Distributors
Metropolitan District
Henry Waldeim
187 *Midland Avenue*
Kearney, N. J.

Consider Building Roofed Airdrome At the Oakland Municipal Airport

SERIOUS consideration is being given to the project of erecting a roofed airdrome at the Oakland Municipal Airport, according to a recent statement from the Board of Port Commissioners, which has charge of the port. The plan under consideration provides for a structure into which the largest planes now projected can taxi to load or discharge passengers and cargo under cover.

One side of the great structure will have facilities for loading motor trucks, while the other, on the water edge of the airport, will have docking facilities for motor craft to connect the airport with San Francisco across the bay. Dredging of a channel is well under way, and as soon as it is completed the expectation is that transcontinental mail will be handled by motor boat between San Francisco and the airport instead of by train and motor truck as at present. It is said that the new channel will bring the airport within 15 min. of the present post office station at San Francisco.

The concrete foundation for Hangar No. 3 is nearly complete now, and erection of steel for the new structure will begin shortly. This will be the largest hangar built at this field, being 110 by 300 ft. Like Hangar No.'s 1 and 2 it will be of steel and corrugated iron with a clear span from wall to wall.

Installation of a new pneumatic pressure water system at the airport has been completed and the laying of pipes is now in progress.

Omaha, Neb., Air Mail Field to be Equipped Soon With Radio Station

THE OMAHA air mail field at Fort Crook will soon be equipped with its own radio station, as construction permits have been granted to the Boeing Air Transport, Inc. Nineteen landing fields in the Western States will be equipped, it is believed. Permission for construction was granted by the federal radio commission.

The company plans to keep in direct contact with its passenger, freight, and mail carrying planes over the airways connected by the fields and also has asked licenses for telephone transmitters for 25 planes.

Three wave lengths of 53.7, 71.8 and 131.8 meters length, at not exceeding 1000 watts power, will be utilized.

Stations will be located at Chicago, Iowa City, and Des Moines, Ia.; Omaha and North Platte, Neb.; Salt Lake City, Utah; Elco and Reno, Nev.; Cheyenne and Rock Springs, Wyo.; Sacramento, Oakland, Reading, Concord, Los Angeles, and Fresno, Calif.; Seattle, Wash.; and Portland and Medford, Ore.

F.A.I. Awards Lieut. C. C. Champion The Altitude Record for All Types

THAT LIEUT. C. C. Champion's altitude mark of 38,418 ft. stands as the world's record for all types of aircraft was the recent decision of the Federation Aeronautique Internationale in a report to the National Aeronautic Association. Champion is a U. S. Navy flier.

Donati, famed Italian altitude flier, reached a height of 38,559 ft. in a recent flight, but this mark was not given recognition because the rules require the old height to be surpassed by 100 meters or more.

Milwaukee Airport Manager Goes With the Department of Commerce

LEONARD EBERT, manager of the Milwaukee county airport, has resigned to become an assistant airways engineer in the aeronautics branch of the Department of Commerce. He has been succeeded at the airport by Chris Setvate, his assistant for the last year.

Mr. Ebert's new duties will include the inspection of a portion of the lighting systems and the airways beacons laid along air mail routes in the middle west. His headquarters will be in Milwaukee.

Preliminary indoor tournaments in the model plane contest in Milwaukee were concluded recently under the direction of the School Board Extension Division and sponsored by the Association of Commerce. Hundreds of people watched the contests at the various social centers which eliminated all but 75 boys and one girl who will compete in the championship contest, the date and place of which has not yet been arranged. So successful was the indoor tournament that decision was made to hold an outdoor plane flying contest during June.

U. of Michigan Students Give Wind Tunnel Demonstration at Detroit

DEMONSTRATIONS of various aerodynamical principles were given by University of Michigan aeronautical students at the All-American Aircraft Show in Detroit. A model wind tunnel capable of producing a wind current of 30 m.p.h., designed by E. N. Fales, aeronautical engineer in charge of the large tunnel owned by the University, was shown. The model tunnel was 18 in. in diameter and its fan was driven by a ⅛ hp. electric engine.

A small airfoil placed in the wind current created, demonstrated its lifting power registered by means of a gauge. The angle of attack of the wing section was changeable.

Electric power was generated by a small fan placed in the air stream, which was attached to a small generator. This current so developed lighted small searchlights similar to airport lights.

A model hangar with tiny holes in the roof attached to tubes to register air pressure when placed in the air current was shown. Another model demonstrated the amount of thrust of a tri-bladed propeller.

R. W. Miller of Ypsilanti, Mich., a graduate student in the aeronautical department, and Charles Strang of East Orange, N. J., were in charge of the University's display.

Newly Formed Baltimore Aero Club To Teach Members Flying at Cost

THE BALTIMORE Aero Club has been organized with W. F. Peck at its head. Warner S. Hull and G. L. Hain have been elected vice president and secretary respectively. The purpose of the club is to study the construction, operation, and principles of the airplane, increase interest in flying in Baltimore, and to enable members of the club to learn to fly at a smaller cost than asked at a commercial school.

Negotiations are under way for the purchase of a three place plane. A vacant lot in the northwestern section of the city will be used as an airfield. The club was organized with nine members, and there have been recruits at every weekly meeting. A charter will be obtained from the American Society for Promotion of Aviation.

STEFCO STEEL HANGARS

PROVIDE PERMANENT, FIRESAFE HOUSING AT A MINIMUM OF COST

STEFCO Standard Hangar of the Stinson Aircraft Corp., Northville, Michigan, 70 ft. clear span width by 76 ft. length by 14 ft. height, with maximum clear door opening of 66 ft.

A New Use For An Old Product

STEFCO Standard Buildings are showing the same popular demand in the aero field that they have enjoyed for years with industry in general. Standardized in clear span widths up to a hundred feet, they meet the peculiar demand of the aero industry for wide spans, unobstructed by posts or columns, and for maximum door openings for plane manipulation.

Standardized Construction Means Quick Service

STEFCO Buildings are quantity produced for quick service and are usually delivered by the time the floors and foundations are ready. They are of all-steel construction and as such are firesafe and lightning proof. The exclusive STEFCO design in the largest sections practical for car shipment and field handling renders the erection comparatively as fast as the shipment so that the utility of a STEFCO Hangar is accomplished in a surprisingly short time. Likewise this same principle of sectional design permits quick expansion to meet future growth demands. And the cost saving above foundations is at least one half over brick or concrete.

Stefco Steel Co., Michigan City, Ind.

Please furnish full information, price and delivery on a STEFCO Standard Hangar ..... ft. wide by ..... ft. long by ..... ft. high. Size plane door opening ..... ft. wide by ..... ft. high. Windows ..... sq. ft. on sides ..... sq. ft. in ends .....

Name .....

Address .....

Advisory Service Free

Advisory service of our Engineering Department is at your command without obligation. Fill in the accompanying coupon showing your requirements and complete information will be forthcoming by return mail.

STEFCO STEEL COMPANY

MANUFACTURERS OF

GENERAL OFFICES AND WORKS — MICHIGAN CITY INDIANA U.S.A.

Stefco

READY-BUILT STEEL BUILDINGS

THANK YOU *for mentioning* **AVIATION**

Detroit Show Side Lights

The Kinner 100 hp., five cylinder radial engine, manufactured by the Kinner Airplane and Motor Corp., Glendale, Calif., is the third engine to be approved by the Department of Commerce. The first was the 135 hp. Fairchild-Caminez and the second the 100 hp. Warner Scarab.

Mono Aircraft, Inc., Moline, Ill., is planning a four place cabin monoplane similar to the Monocoupe, to be powered with a larger Velie engine.

Towle Marine Aircraft Engineering Co. of Detroit is developing an amphibian flying boat that is planned to make a world cruise.

Stearman Aircraft Co., Wichita, Kan., is completing the design of an interesting closed cabin biplane with the roof of the cabin fairing into the upper wing. There is a window in the back allowing a 360 deg. range of vision in a horizontal plane. It is designed to be powered with anything up to 400 hp.

The General Aircraft Corp. has been formed at Buffalo, N. Y., and is designing a complete line of airplanes.

The contracts for the Army bombers will be awarded within the next week or so. The competing planes were: the Curtiss Condor, Consolidated Sikorsky Guardian, Keystone Super-Cyclops, Keystone Panther, and Fokker XLB-2.

Orin Welch is producing planes at Anderson, Ind.

The Mohawk Aircraft Corp. of Minneapolis, Minn., is bringing out a Mohawk Pinto with a very original type of closed cabin.

Bellanca Aircraft Corp., Wilmington, Del., is constructing a new Bellanca plane powered with a Pratt & Whitney Hornet engine. It differs radically from any present design.

The Cabinaire, four place biplane powered with a Warner engine and produced by the Paramount Aircraft Co., Saginaw, Mich., is starting on a tour of the country.

Pioneer Instrument Co., Brooklyn, N. Y., has developed an interesting gasoline flow meter for indicating the rate of fuel consumption.

Lenert Aircraft Co., Pentwater, Mich., is bringing out an improved model of the one exhibited at the Aircraft Show.

There were three planes exhibited using the Warner engine: the Paramount Cabinaire, the Stinson-Detroiter Junior, and the Aero-Craft Aero-Coupe.

The Dayton Airplane Engine Co. is preparing the Dayton-Bear, a 110 hp. four cylinder in line, air cooled engine for test by the Department of Commerce.

The LeBlond Aircraft Engine Co., Cincinnati, O., will shortly be in production on its 40, 60, and 90 hp. engines.

The Sikorsky Manufacturing Corp., College Point, Long Island, N. Y., has announced the completion of the first Sikorsky S-38, cabin amphibian powered with two Pratt & Whitney Wasp engines. The plane closely resembles the S-36, powered with two Wright Whirlwinds.

The Buhl Aircraft Corp., Marysville, Mich., is completing the Buhl Junior Airsedan, a closed cabin sesqui-plane powered with the Warner engine. The lower wing tapers so that it is almost triangular in shape. It is designed to carry two passengers and pilot.

At the time of this writing the Curtiss Robin is undergoing flight tests at Curtiss Field, Long Island, N. Y. It is a three place monoplane powered with a Curtiss OX-5 engine.

The "American Moth", built by the Vulcan Aircraft Co., Portsmouth, O., attracted considerable interest at the Ford Airport during the Aircraft Show.

The Comet engine produced by the Aircraft Engine Co., Oakland, Calif., is being tested in Washington, D. C., for approval by the Department of Commerce.

The Packard X, 24 cylinder water cooled engine, has been fitted with a supercharger and is said to develop 1500 hp.

The Texas Pacific Coal and Oil Co., producer of Amlo airplane engine lubricating oil, ran some interesting comparative tests on the various lubricating oils at the Aircraft Show.

The Loening Cabin Amphibian, manufactured by the Loening Aeronautical Engineering Corp., New York City, is starting on a tour of the country.

Kendall Refining Co., Bradford, Penna., had an interesting exhibit at the Hotel Statler.

Wichita, Kan., has not yet been placed on the route to be flown by the 1928 Reliability Tour but will be before the planes take off.

It is understood that the Detroit Chamber of Commerce is planning to make the All-American Aircraft Show an annual event.

Commander Byrd will use Veedol oil on his Antarctic expedition.

A number of manufacturers have already signed up for the aircraft show to be held in Chicago in December.

The Detroit Board of Commerce issued an Air Transport Survey at the time of the Show. By a carefully worked out questionnaire they gathered much valuable information as to the patronage which citizens of Detroit could be expected to give to air lines and to the air mail. The results were on the whole surprisingly hopeful, but the survey also stresses limitations of use under present conditions.

Many of those expecting to fly home from the Show were disappointed because the planes were sold and flown away by new owners.

The publishers of aeronautical magazines were present in large numbers at Detroit. They held a good-will breakfast at which the subject of raising the standards of advertising copy was discussed.

Among other things admired at Detroit was the quality of the beer.

Several firms will be able to advertise that Lindbergh sat in their planes.

Rules Are Established in England For Flying on Country's Airways

RULES FOR flying along established airways in Great Britain have been laid down by a recent amendment to that country's Air Navigation Order, according to the *Air Pilot* received in the Transportation Division of the Department of Commerce.

The new rules are said to aim at lessening the risk of collision on much-used air routes. The amendment states:

"In order to obviate the increased risk of collision which exists on air traffic routes, the following rules shall, so far as it is safe and practicable, be observed when flying on or in the vicinity of such routes:

"(a) Every aircraft when flying by compass along the straight line joining two points on an air traffic route in common use, shall keep such line at least 500 yd. on its left.

"(b) Every aircraft following an air traffic route, which has been officially recognized, shall keep such route at least 300 yd. on its left.

"(c) Every aircraft which, in the vicinity of a route frequented by aircraft, is following a line of land marks such as a road, railway, river, canal, or coastline, etc., shall keep such line of landmarks at least 300 yd. on its left.

"(d) An aircraft shall not fly keeping any of the lines or routes above referred to on its right, except at a distance therefrom sufficient to avoid aircraft following such lines or routes in accordance with these rules.

"(e) When crossing one of these lines or routes above referred to, an aircraft shall cross it at right angles as rapidly as possible and as high as reasonably practicable."

Memorial to Lafayette Escadrille Will be Dedicated in Paris July 4

AN ARCH of triumph bearing on its face the names of the dead pilots of the Lafayette Escadrille is to be formally dedicated in Paris on July 4 of this year, according to an announcement by the Conseil of the Memorial de l'Escadrille Lafayette. The central arch of the monument, now nearing completion, carries the names of the members of the Escadrille who gave their lives, and a French inscription surmounts the arch which reads "To the Memory of the Heroes of the Lafayette Escadrille Who Died in the Defense of Right and Liberty."

It is the desire of the committee in charge that ex-pilots of this famous fighting group attend the dedication this summer. The French State Department is being asked to waive the American passport fee, and the Ministers des Affaires Etrangeres has been requested to waive the visa fee and dispense with identification card requirements of those attending.

Louis Crenshaw, official in charge, may be addressed at 83 Rue Perronet, Neuilly-sur-Seine, France. Crenshaw is now negotiating for reduced steamer and railway fares for the Escadrille members and their families.

Three Germans Come to America To Give Glider Flight Exhibitions

ROEHRE, HESSELBACH, and Dahlenthal, three members of the Rhoen-Rossitten Society, a German glider organization, have arrived in America from Bremerhaven to give flight exhibitions with their glider "Darmstadt", which last year scored several new records in the Rhoen competition. The Germans have come at the invitation of an American engineless aviation club.

The Airsedan

For The Discriminating Purchaser:

THE AIRSEDAN

AIRLINE OPERATORS will find this plane meets with all their requirements. The cabin has exceptionally comfortable seats for four large passengers and the pilot's visibility is unexcelled.

PRIVATE OWNERS will approve of the fine appointments which are selected to satisfy the most critical taste.

CORPORATIONS desiring to keep step with the progress of the times will find that here is an efficient and up-to-date vehicle for transporting executives and personnel to widely separated branches.

We will be glad to assist you in determining the adaptability of this fine product to your requirements.

BUHL AIRCRAFT COMPANY
Marysville Michigan

Lieut. N. A. Goddard Heads Flying School on Campus at Stanford U.

A SCHOOL of aviation is now being operated on the campus of Stanford University, Berkeley, Calif., 70 acres having been leased by the University in the southeast corner of the Farm, bordering the state highway to San Francisco, to Lieut. Norman A. Goddard, U.S.N.R., who is conducting the training school. A course in flying is thus open to Stanford students who are doing work in the Daniel Guggenheim

Training planes lined up on Lieutenant Goddard's flying field.

Aeronautic Laboratory connected with Stanford's school of engineering. The airport, furthermore, offers a field for the neighboring town of Palo Alto.

On the northeast corner of the field is an administration building with offices and classroom accommodations for 50 students, a steel hangar sufficiently roomy for eight planes with construction classroom included, a repair shop, and janitors' quarters. The hangar is equipped with wind cone and marked on the roof with the school name, lights for night landings are to be installed, and three runways are now being used, 2,900 ft., 2,400 ft., and 1,500 ft. in length, respectively.

The school is exclusive representative for Waco and Fairchild planes in Santa Clara and Santa Cruz counties, Gilbert C. Wheat being sales manager. Lieutenant Goddard has chosen the Waco 10 for training purposes and has two in constant operation with a third shortly to be added for graduate students who desire to obtain flying time for the higher licenses. Goddard's monoplane "Gypsy", his Dole Race entry, is also at the field, having been rebuilt.

Lieutenant Goddard, who is in charge of the school, received flying training in the Royal Naval Air Service in 1914 and did submarine scouting work over the North Sea. Detached from active duty after having been shot down by enemy planes and drifting at sea for 72 hr., Goddard acted as instructor in the Canadian Air Force until the close of the war, graduating as Aero Engineer in this service. He later moved to California and is now senior lieutenant in the U. S. Naval Reserve with 3300 hr. flying to his credit.

Newly Formed Albany Air Service In Operation at Westerlo Island

FORMED TO operate a complete flying service, including long distance trips, instruction, aerial photography, and advertising, the Albany Air Service, Inc., was recently opened at Westerlo Island Field, near Albany, N. Y. Gasoline, oil, and telephone service has already been installed at the field and a hangar and office will shortly be erected.

George E. Walker is president of the company, while Oliver E. Townsend is vice president and chief pilot, and R Harry Porter is field and operations manager.

KING OF THE AIR

AIR-KING

Powered with Wright Whirlwind, Ryan-Siemens, Anzani, Caminez, OX5

AIR KING DISTRIBUTOR FOR
Iowa, Northern Illinois,
Southern Wisconsin

Good Responsible Dealers Wanted

Complete aeronautical courses with transport pilots, full particulars on request.

Approved Type Certificate No. 29.

The EAGLE AIRPORT
School of Aviation
HINCKLEY, ILLINOIS

Two New Airport Lighting Units Announced by General Electric Co.

TWO NEW lighting units for airport use have been developed by the General Electric Co., one being an intermediate field boundary light and the other an airport ceiling light.

The intermediate unit is recommended for use on a multiple circuit at small airports where the number of lamps around the entire field will not exceed 30. For such installations, the manufacturers recommend the use of the light with 2-conductor, No. 10 parkway cable laid in two separate circuits to a point half-way around the field. The units are equipped with clear, ruby, or green globes. Clear globes are used to indicate the boundaries, and ruby globes are used to mark obstructions, while the most favorable approaches to the field are indicated by green globes. The light may be used with 25, 40, 50, or 60 watt lamps.

Used to Determine Cloud Height

The ceiling light is used at airports to determine the approximate height of fog or clouds above the ground, so that this information can be transmitted along the airway for the benefit of the approaching pilot. It is equipped with a noncorrodible, aluminum alloy drum, attached to the side of which is a pad for setting the beam of the searchlight at 45 deg. instead of horizontally. As this light need not be changed after the initial setting, a permanent method of mounting is provided.

New York-Atlanta Air Mail Line To be Opened by Pitcairn May 1

SERVICE OVER the New York to Atlanta air mail route is to be inaugurated May 1, Geoffrey S. Childs, general manager of Pitcairn Aviation, Inc., of Philadelphia has announced. Under tentative schedules, planes will leave New York and Atlanta in the evening and arrive at Atlanta and New York, respectively, in the early morning, a run of about nine hours. Stops will be made at Philadelphia, Washington, Greensboro, N. C., and Spartanburg, S. C.

Pitcairn Mailwing planes are to be used over the route. These airplanes have been especially designed for mail flying, passenger seats being omitted and a large fireproof and rainproof mail compartment substituted with a mail capacity of 350 lb. Cruising speed of this type plane is better than 100 m.p.h. and the high speed is over 130 m.p.h.

Holcker Manufacturing Co. Opens Department to Make Plane Parts

AN AIRPLANE department for the manufacture of parts has been opened by the Holcker Manufacturing Co. of Kansas City, Mo., according to a recent announcement. This company has built coach bodies for more than 40 yr.

Utilizing skilled labor essential to this work, the company is now open to orders for special cowl work and aluminum and gas oil tanks. Aluminum gas tanks have been made by the concern for more than a year, a number of them now being used by the National Air Transport Co. with over 800 hr. of flying time. The plant has a floor space of better than 80,000 sq. ft., and the large machinery used in body work is said to enable the manufacture of parts for the airplane trade at a great saving.

B&B SERVICE

"How To Use
Aviation Insurance Protection
Economically and Advantageously"

—is the title of our new brochure. Ask us for a copy.

It explains also our free advisory service founded on 20 consecutive years' practical experience in aviation and supported by our corps of highly qualified aeronautical engineers and our staff of executives each one of broad practical experience in flying besides long training in insurance. Our experience, knowledge and organization are at your service to assist in minimizing hazards with consequent reduction of operational costs and insurance rates, thus helping to improve, broaden and stabilize both your interests and our interests as Underwriters. Cooperation is the key to that result and is achieving remarkable improvements. Our success is founded on service and sympathetic cooperation fortified by long experience.

Insurance Protection Available
aggregates over $750,000 per aircraft

Constructive total loss	*Life insurance*
Accidental Damage	*Public liability*
Fire, Tornado, Theft	*Property Damage*
Cargo (direct and liability)	*Passenger liability*
Damage to ground property	*Personal Accident*
Airport and Airmeet liability	*Compensation*

LOWEST RATES
BROADEST COVERAGE
HIGHEST INDEMNITIES

Policies have been issued over a long period of years and, among others, in favor of Federal and State Governments, Boeing Air Transport, Inc., Colonial Air Transport, Inc., National Air Transport, Inc., Western Air Express, Inc., Robertson Aircraft Corp., Colorado Airways, Inc., Northwest Airways, Walter T. Varney, Inc., Southern Dusting Co., Inc., Philadelphia Rapid Transit, Stout Air Service, Inc., Boston Airport Corp., American Railway Express, Ford Motor Company, Fairchild Aerial Surveys, Fairchild Flying Corp., Pacific Marine Airways, Pitcairn Aviation, Inc., Western Canada Airways, Andian National Corp., United Cigar Stores Co., Royal Typewriter Co., Hamilton Maxwell, Inc., Pulitzer and other race meetings, Universal Motion Picture Corp., Fox Film Corp., The Daniel Guggenheim Fund for the Promotion of Aeronautics, Inc., and many others including Col. Charles A. Lindbergh and other leaders in aviation.

Barber & Baldwin, Inc.
Underwriting Agents
Graybar Building New York City
Tel. Lexington 4316

Oklahoma Airlines, Inc., of Tulsa To Offer Service in Many Cities

A CORPORATION was recently formed in Tulsa, Okla., the Oklahoma Airlines, Inc., to act as airplane agent, operate schools and offer other aeronautical services in some 12 different cities. The No. 1 airport, located at Tulsa, is of 180 acres in extent, and the company is considering adding an additional 100 acres.

An 81 ft. beacon tower has already been erected at this field, which has two natural runways, and hangars are to be built shortly. Teams and tractors are now at work grading, sodding the ground, and building cement driveways. Besides 18 steel hangars ranging in size from 40 x 40 to 60 x 120, a machine shop and repair service building is planned. A clubhouse will combine administration offices and quarters for 80 men and will be 50 x 150 in size with a veranda.

Elmira Flying Service is Formed To Give Instruction to Members

THE ELMIRA Flying Service, Inc., was recently formed at Elmira, N. Y., with a membership of eight. The company was organized for the purpose of promoting interest in flying and for giving instruction to members.

A Curtiss Oriole plane, purchased a short time ago from the Wilson Aerial Service at Rochester, N. Y., is now in use and is kept at the Elmira Airport hangar. William F. O'Brien of Elmira is head of the enterprise.

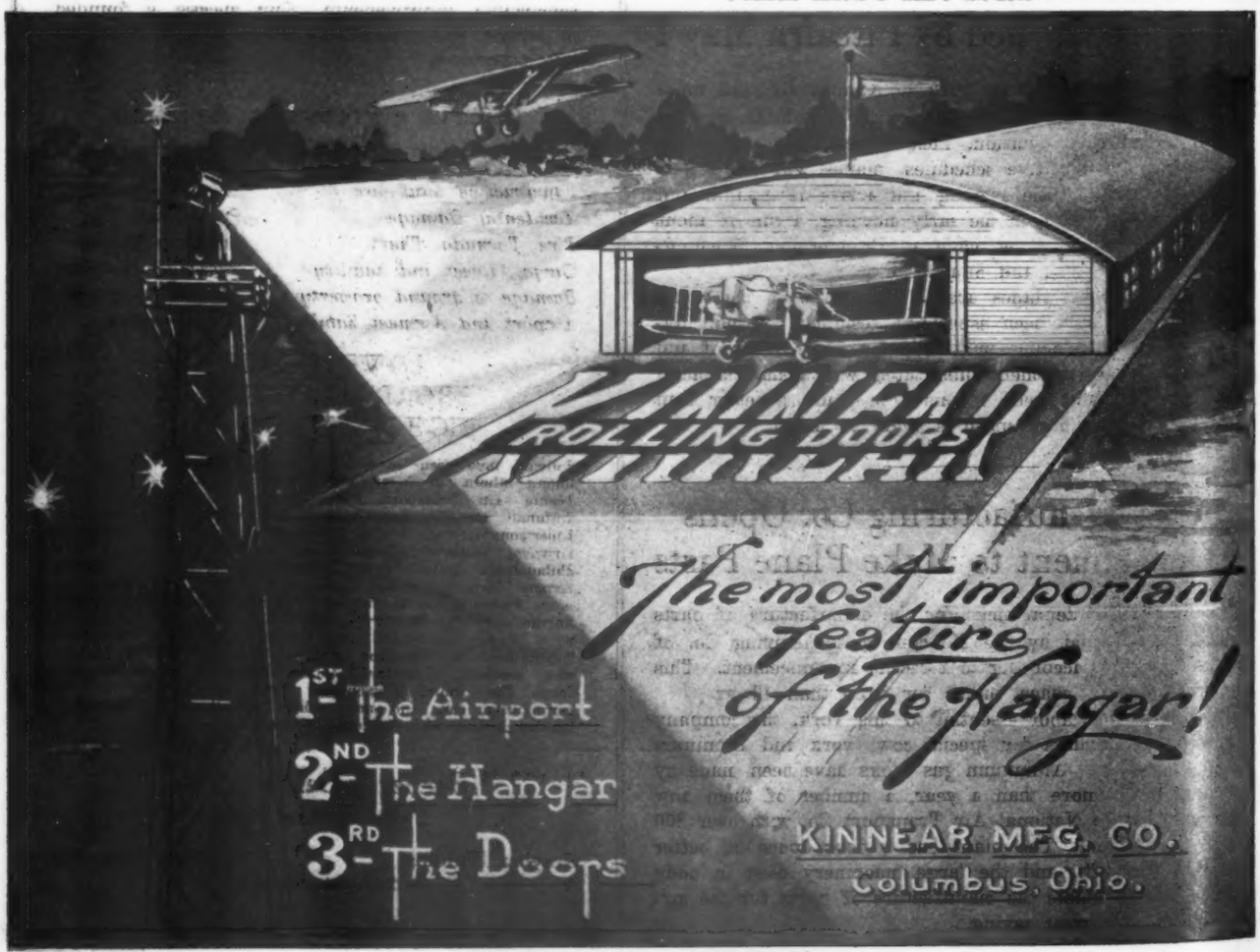
The Detroit S.A.E. Meeting

Continued from page 1212

Warner pointed out the great value of this work and reiterated the fact that it was much easier to standardize on a few sizes before an industry had progressed too far.

Although the object of the meeting was to bring the work already done by the sub-committees before the commercial manufacturers of planes, engines and accessories for discussion few of those interested were represented. Three commercial aircraft engine manufacturers had engineers present and several accessory men were there, but engineers of active commercial aircraft factories were conspicuous by their absence.

The first subject for discussion was the adoption of standards for bolts, nuts, shackles, turnbuckles, etc. On all these objects the Army and Navy have established pretty definite standards and on the whole it was the opinion of the subcommittee that these were suitable for commercial use. The point was made that the size of the parts was often not as important as the strength of the material and it was proposed that parts of high tensile strength should be marked in a special way. Further discussion of this was put off until a later date. On the question of wheels and rims there seemed to be a rather divided opinion, the tire, brake and wheel people feeling that there were already enough standard sizes, while the few aircraft operators who were present felt that the number might be increased. A standard of tail skid shoe mounting was proposed, but it was felt that the trend of design was not sufficiently definite to permit of standardi-



THANK YOU *for mentioning* AVIATION

zation. In the matter of instruments, Archibald Black, who was chairman of the sub-committee, proposed that the dial of instruments be standardized in a size somewhat smaller than those at present used. As many were doubtful of the practicability of smaller dials the matter was postponed for further discussion.

The standardization of engine mounts brought forward a considerable amount of discussion and it was pointed out that it was very difficult to design an engine around an engine mount and that it would probably be more practical to design special mounts for each engine which could be detached from the fuselage. Four standards for propeller hubs were adopted, each for a different powered engine. The standard does not follow any logical rules but copies established practice in various types of engines. The Army and Navy standard of starter mount was adopted but it was also suggested that a smaller mount might be necessary in commercial engines.

Many interesting points were brought out during the various discussions and it was unfortunate that more commercial manufacturers were not able to attend this important meeting.

The All-American Aircraft Show in Retrospect

Continued from page 1207

gether in one section while the rest were located in various places about the Hall.

Most of the well known engines were exhibited in cutaway form and operated by an electric motor. They of course attracted attention as it was a splendid opportunity for the layman to view the "mysterious" workings of famous engines, the names of which have almost become household words.

The new engines, practically all of which have yet to be thoroughly tried in actual service, received most of their attention from those persons actually connected with the aeronautic industry. Of course the layman did not pass them by without a glance, but as far as could be noted the ones

Picture of the attractive and well laid out exhibit of Norma-Hoffmann Bearings Corp.

who stopped and made close examinations were those who know that the industry is in need of a reliable and proven low horsepower engine that can take the place of the well known OX-5. And, incidentally, it was interesting to note that with the exception of war surplus power plants all of the engines installed in the planes on exhibition were air cooled.

The accessory exhibits were particularly interesting be-

LUDINGTON

The Ludington Philadelphia Flying Service, Inc.

The Woodworking Shop

. . . . Announces the completion of their new woodworking and metal shops, with over 8800 square feet of shop space and complete equipment for all types of repairs at reasonable rates, with competent workmen.

Ludington Philadelphia Flying Service, Inc., Philadelphia Airport

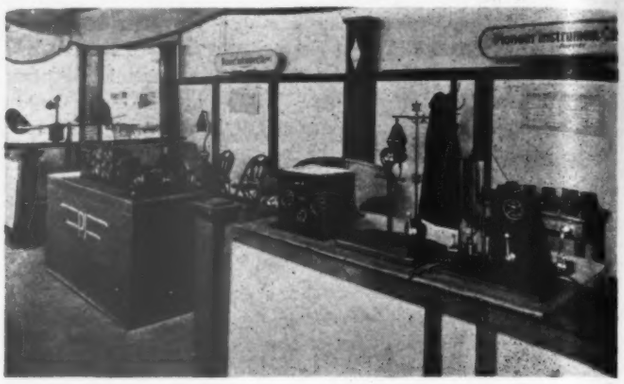
cause of the fact that the application and uses of the various products were clearly portrayed. Actual working demonstration was given in practically every case, and it was quite evident that these exhibitors had devoted considerable time and thought in preparing their respective displays. As a matter of fact some of them were of sufficient interest and

Side view of an OX-5 Travel Air biplane equipped with pontoons.

attractiveness to have received a much better location in the Hall than they did receive. However it is impossible to please everyone and those in charge of the Detroit Show are to be complimented on their arrangement of the exhibits, when one considers the existing conditions with which they had to contend. With the experience gained by the holding of the Detroit Show it is quite probable that the matter of locating exhibits will be given more attention in the future.

The manner in which the Show was conducted was most satisfactory, and the Detroit Board of Trade and the Aeronautical Chamber of Commerce are to be congratulated on the splendid results of their sincere efforts. Ray Cooper, manager of the Show, is particularly deserving of praise. It was indeed unfortunate that illness confined him to his home the first few days. His appearance in the middle of the week was enthusiastically welcomed by all who know him.

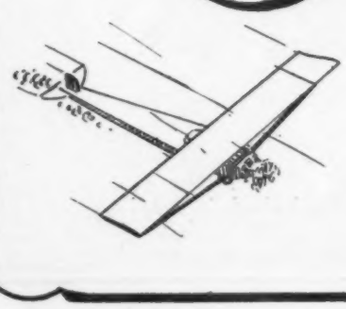
Apart from the opportunity for the industry and the public to inspect the very latest developments in commercial aero-



The exhibit of the Pioneer Instrument Co. At the left can be seen an earth inductor compass mounted on a pedestal.

nautics one of the greatest benefits afforded by the Detroit affair was the chance for the members of the industry to make new acquaintances. It proved to be an ideal time for the holding of various conferences, for almost every one of importance in the industry visited the Show at some time

Learn to Fly Safely



To be a successful cross country pilot you must know Navigation and Meteorology. You cannot pass that coming examination without it.

Written in plain language which you can understand with all unnecessary matter eliminated.

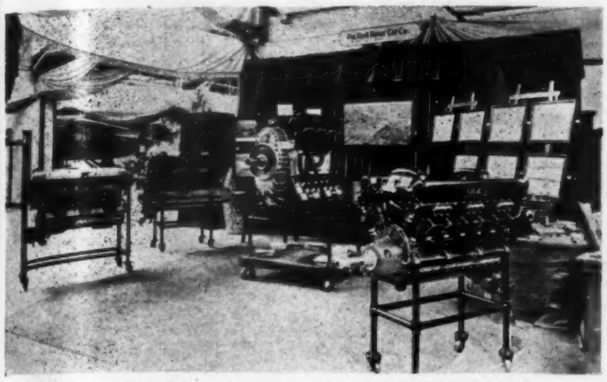
$2.50 POST-PAID

CAPT. Lewis A. Yancey
425 West End Ave.
NEW YORK CITY

Captain Lewis A. Yancey,
425Y-West End Ave., New York City.
Here's my check or money order. Send me your book post paid.
Name .....
Street .....
City ..

during the week. It would have been of great assistance had some sort of booklet been published listing the names of out-of-towners and the hotels at which they were stopping. Undoubtedly this will be done the next time.

In summary, the All-American Aircraft Show was a great success and a credit to the industry. It marked the beginning of a new era in the history of American commercial



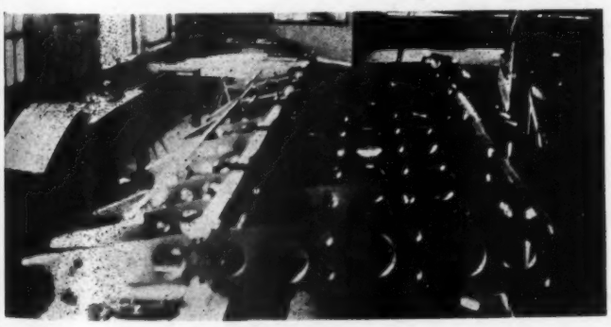
The Packard Motor Car Co. exhibit. The engine in the middle is a 24 cylinder Packard X engine.

aeronautics. It was the first of its kind in this country, if not in the whole world, and the value of the experience gained in the holding of commercial aircraft shows is inestimable. Whether or not the 1929 show will be held in Detroit is something to be decided when the smoke clears away. At any rate Detroit has established a meritorious precedent that other cities will find difficult to surpass.

The Halpin "Flamingo"

Continued from page 1211

drag load. The inner bay, on each side of the fuselage, is taken up by a terneplate gasoline tank of 75 gal. capacity. To facilitate quick filling of the tanks, in service, they are fitted with 3½ in. diameter filler necks which permit filling without the use of a funnel. The tanks are in line with the center of gravity so that their contents does not affect the



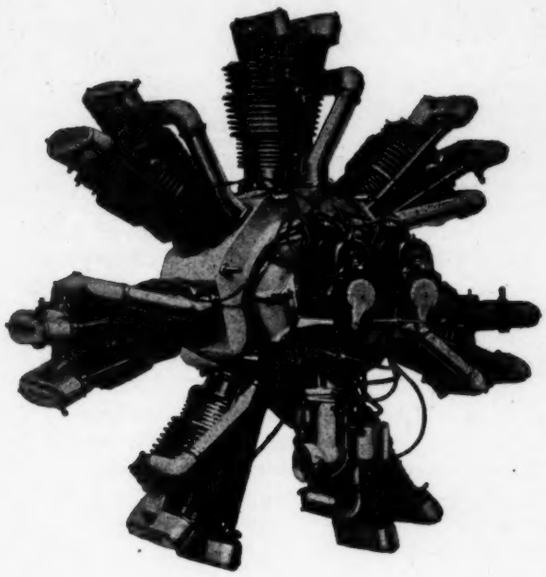
Showing wing construction. Both ribs and spars are made of duralumin.

balance of the plane. The wings are pin jointed to the sides of the fuselage utilizing the depth of the wing to increase the head room in the cabin.

Unlike the wing, the fuselage is braced internally by closed section, seamless, steel, tubing welded into a truss similar to that used on a fabric covered design. The metal skin is fastened to light duralumin channels riveted to clips placed on the tubes. The cabin is unobstructed by any bracing; it is 10 ft. long, 5 ft. high and 3 ft. 8 in. wide, with a volume of 195 cu. ft. At the left of the pilot's compartment is a door

FLOCO

Floco A-7-R Static 7-Cylinder Radial Air-Cooled Motor. 150 H.P. Nominal at 1800 R.P.M.



Aerobility, speed, power, flexibility, and durability are the outstanding qualities of the new Floco Aviation Engines—the result of years of intensive, concentrated engineering effort. Floco at once meets the demand of the commercial field for a quality motor at a modest price, capable of coming through—with power to spare—under all conditions. ¶ Advanced motor design brings in the new Floco many exclusive features which make this master motor the peer of its class. Investigate these ultra-modern motor refinements. On request we will gladly send complete information, specifications, and illustrations. Write us at once.

FRANK L. ODENBREIT, Inc.
138 West Seventeenth Street
Los Angeles, California

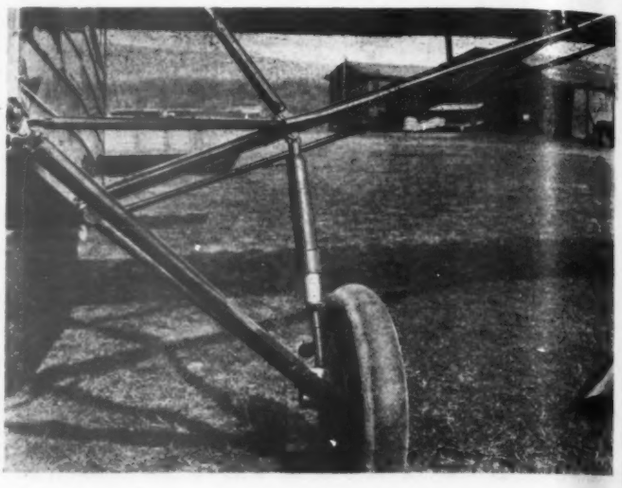
while the entrance to the passenger compartment is through a full size door on the right. Running the length of the cabin, on both sides, are glass windows 14 in. high. The glass in the cabin is ¼ in. plate with edges ground and polished, while the glass around the cockpit is non-shatterable. The windows are mounted in aluminum frames which are contrasted, in the interior, with gray duo-tone fiber board trimmed with red. The ceiling is fitted with dome lights above the passenger seats. These seats are upholstered reed chairs secured to the floor. Behind the passenger cabin is a compartment with a 40 cu. ft. baggage hold, toilet and wash room facilities. In front of the passenger cabin is the pilot's compartment with two side-by-side seats fitted with dual wheel control.

Pioneer Instruments Used

Cables are used throughout in the control system. The control wheels are fitted with sprockets and chains which are attached to the cables. The cables run over Micarta pulleys to control horns on all surfaces. The rudder pedals are of the stirrup type while the wheel brakes are operated individually by a hand lever in the center of the cockpit. Pioneer instruments are used and navigation lights are mounted on the wing tips and fin to conform with the Department of Commerce specifications. Provision is also made for landing lights which will be streamlined into the wing tips.

The control surfaces are of high aspect ratio and nearly rectangular in shape. The ailerons are of the mitered type set in one foot from the wing tips. They are differentially controlled. The horizontal stabilizer is adjusted by a screw mechanism controlled from the cockpit and is self-locking in any position. The vertical fin is adjustable on the ground. All of the control surfaces are constructed of duralumin channels covered with .014 in. corrugated sheet duralumin. The fixed surfaces are externally braced and the movable surfaces are mounted on self-aligning ball bearings.

The landing gear is of the divided axle type with the members braced to the wing support struts and to the fuselage longerons. The landing gear rotates about the lower longer-



Showing the Aerol Shock Absorber landing gear. The brakes are operated by a lever which will attach wheels separately or together.

on to which it is attached at two points. The shock absorbing member is vertical, attached to the wing brace which, in turn, is supported from the upper fuselage longeron. The shock absorber is an Aerol strut unit. The members of the undercarriage are of heat-treated chrome molybdenum steel tubing faired with sheet duralumin. The wheels are 30 in.

The STEARMAN-*Whirlwind*

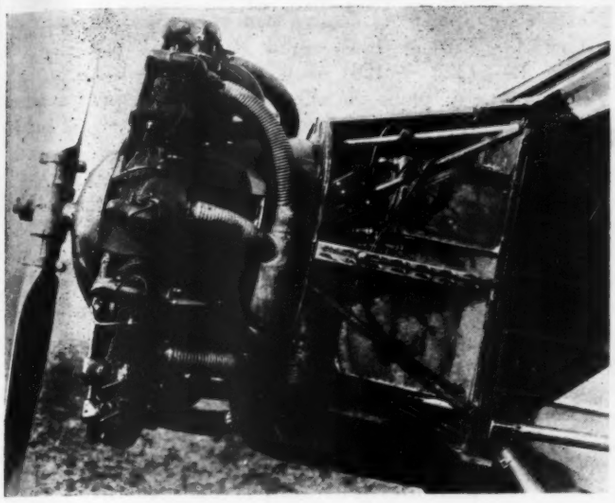
STEARMAN AIRCRAFT are not built with the intent of competing in that already large field of manufacturers wherein sales are dependent on the low selling price of a product.

STEARMAN AIRCRAFT HAVE A PERSONALITY

The Stearman Aircraft Co., Wichita, Kansas

by 5 in. Sauzedde wheels fitted with brakes that operate either separately or together. The usual tail skid has been replaced by a small steel wheel faired with aluminum and fitted with a 3½ in. flat steel tire. The wheel is mounted so that it may swivel, enabling the plane, by means of the brakes, to turn with a very small radius. The stern post acts as an emergency tail skid.

Standard on these planes is the Pratt & Whitney Wasp engine rated at 400 hp. at 1900 r.p.m. It is fitted with a 10 ft. diameter Standard Steel adjustable pitch propeller. The engine is cowled with .050 in. aluminum sheet with louvres at the sides to provide ventilation. Those at the front



Showing the "Wasp" engine installation, fire wall and 14 gal. oil tank.

may be opened or closed to regulate the temperature of the engine. Set into the cowling so as not to interfere with the streamlining, is the exhaust manifold ring. It is fitted with a heater at the bottom that is connected to both the cockpit and the passenger cabin. An Eclipse hand inertia starter is provided. It is fitted with a special rachet device for starting the engine from the pilot's cockpit. Mounted just forward of the fire wall is a 14 gal. oil tank. This tank is intended to hold 12 gal. of oil. The fire wall is of .032 in. terneplate riveted and soldered to the tubing of the engine mount.

The manufacturer's specifications on the Flamingo are as follows:

Length overall	30 ft.
Height overall	9 ft.
Span overall	48 ft.
Chord	8 ft.
Wing area	354 sq. ft.
Cabin capacity	195 cu. ft.
Tread of landing gear	10 ft.
Weight empty	2,784 lb.
Load	6 people and 600 lb. baggage
Useful load	2,050 lb.
Total load	4,834 lb.
High speed	140 m.p.h.
Cruising speed	118 m.p.h.
Landing speed	48 m.p.h.
Climb	1,375 f.p.m.
Service ceiling	18,000 ft.
Cruising radius	8½ hr. or 1,000 mi.
Gasoline consumption	18 gal. per hr.
Oil consumption	½ gal. per hr.
Gasoline capacity	150 gal.
Oil capacity	12 gal.

Truscon Hangar for the Fairchild Airplane Manufacturing Corp., Farmingdale, L. I.

AIRPLANE HANGARS

Truscon Airplane Hangars are permanent and fireproof. They are assembled from standardized units which can be combined into buildings of any desired length and width. Being laid out in clear spans, their unobstructed floor space assures utmost freedom in handling ships.

Large Sliding Doors

opening the full width of the building, simplify the storing of planes. We furnish Steel Doors for any requirements.

TRUSCON STEEL COMPANY
YOUNGSTOWN, OHIO
ESTABLISHED 1903
Manufacturers and Engineers
WAREHOUSES AND OFFICES IN PRINCIPAL CITIES

TRUSCON BUILDINGS

for all airport requirements and for every need of the Airplane Industry.

Detail information and quotations on request.

Truscon Steel Company
Youngstown, Ohio

Please quote price on Hangar as follows_____
Length Width Height

☐ Please send Descriptive Folder.

Name_____

Address_____

The construction of the Flamingo is the result of the efforts of Thomas E. Halpin who promoted and organized the company. The design was worked out by Mr. Halpin together with Ralph R. Graichen and Walter C. Clayton. Mr. Halpin was formerly assistant to the general manager of the Stout Metal Airplane Co., division of the Ford Motor Co., and was later a pilot with the Stout Air Services. Mr. Graichen was an engineer with the original Stout Metal Airplane Co. and later in charge of control car design for the Aircraft Development Corp. of Detroit, Mich. He is now chief engineer for the Halpin Development Co. Mr. Clayton was formerly with the Boeing Airplane Co. and later with Ford and then Fokker. He is now engineer in charge of production with the new company. The shop superintendent is Frank Hardman, who is assisted by John A. Knoob, with Orrie Fryman, Martin Chappelle and William Chowen as foremen.

Wing Stress Analysis

Continued from page 1210

Beam Loading.

It will be noted from the General Data that the overhang is 126 inches and the chord only 84 inches. The overhang is then materially more than the chord. In the previous chapter it was stated that in this case the loading in Fig. 51 would have to be used for loads inboard of the outer inflection point, and the loading of Fig. 52 for the loads and design of members outboard of this inflection point. That is, the spar at the strut point and the lift or wing struts will be designed by the loading of Fig. 52. For convenience of reference let us call the loadings as follows:

Case A—the loading as shown in Fig. 52.

Case B—the loading as shown in Fig. 51.

It will be necessary for us to analyze the wing almost completely for both cases. In each case the wing will have different effective spans, beam loads, shears, and moments. The two cases will be carried along parallel as far as possible and then Case A will be continued until the wing struts are designed. Then Case B will be carried through until the drag truss is designed. In the next Chapter the spars will be investigated and designed by each case as it applies.

Loads on Wings.

1—Gross weight = 2210 lb.

2—Effective Span: (Effective semi-span S_e is found)

Case A— $(120 + 126) - 0.1 \times 84 = 237.6$ in.

Case B— $(120 + 126) - 0.25 \times 126 = 214.5$ in.

For this type of plane the effective span is merely the actual span of the wing minus a length specified in Figs. 52 and 51 to allow for tip loss. For Case A this length is 0.1 times the chord, and for Case B it is 0.25 times the overhang.

3—Dead weight of wings = 355 lb. $w_d = 355/(120 + 126)2 = .72$ lb. per in. run.

4—This is a monoplane—no efficiency corrections.

5—Normal Gross Beam load:

Case A— $w_g = 2210/237.6 \times 2 = 4.65$ lb. per in. run.

Case B— $w_g = 2210/214.5 \times 2 = 5.15$ lb. per in. run.

6—Normal Net Beam load:

Case A = $4.65 - .72 = 3.93$ lb. per in. run. = w

Case B = $5.15 - .72 = 4.43$ lb. per in. run. = w

Check on work:

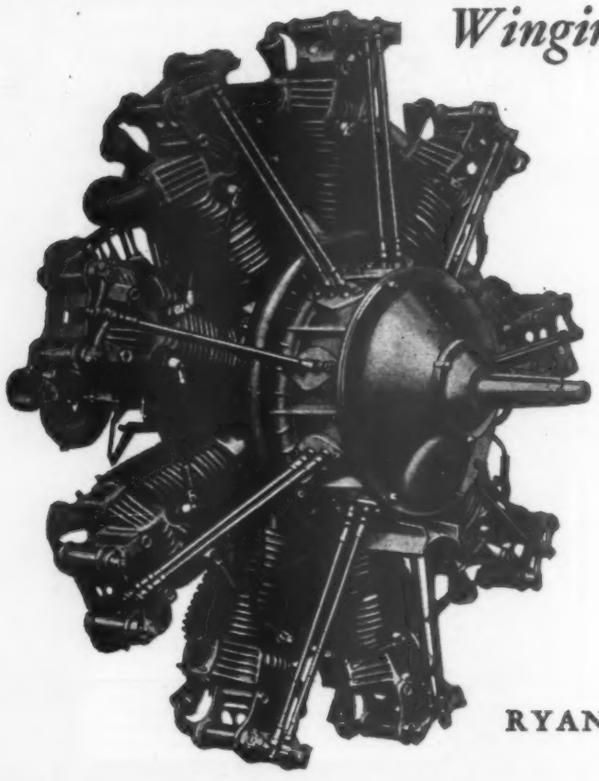
Case A— $2(3.93 \times 237.6) + 355 = 2219$ lb.

2219 lb. equals 2210 lb. approximately.

Case B— $2(4.43 \times 214.5) + 355 = 2255$ lb.

2255 lb. equals 2210 lb. approximately.

The loading of Case B (Fig. 51) depends upon the overhang



Winging Its Way With Leadership

RYAN

¶ The radial air-cooled engine has come to stay. In Ryan Siemens this type of power plant has attained its ultimate perfection! ¶ The result of fourteen years' manufacturing experience, Ryan Siemens Engines hold a record of more than five million miles of actual flight. Approved by the United States Post Office Department for all air mail contract lines—Ryan Siemens is fairly winging its way with leadership! Every builder of quality planes will want the full story of Ryan Siemns power, speed, efficiency, economy and durability. Our new catalog—with full specifications—places the facts before you. Send for it.

RYAN AERONAUTICAL CORPORATION

San Diego, California

of the wing which varies with each plane. 2255 lb. is considerably more than 2210 lb. but is alright as it loads the wing more severly and is thus on the safe side. A difference of 45 lb. in 2200 is not too great.

7—Normal Chord Loads: (Case B only is used for chord loads)

Table of Design Chord Loads.

Flight Condition	Beam Load per inch run	Chord/Beam ratio	Chord Load per inch run	Load Factor	Design Chord Load
H.I.	4.43	—0.144	—0.64	6.9	—4.42
L.I.	4.43	0.15		4.5	
I.F.	4.43	0			
Dive*			3.77	1	3.77

*The net weight of the plane 1855 lb. is distributed uniformly along the beam. No load factor is required.

Chord load in Dive = 1855/(120 + 126)2 = 3.77 lb. per in. run.

Distribution of Loads between Spars.

Case A and B:— H.I and I.F.

Front spar takes 65 — 31/65 — 15 = 68%

Rear spar takes 31 — 15/65 — 15 = 32%

L.I.

Front spar takes 65 — 51/65 — 15 = 28%

Rear spar takes 31 — 15/65 — 15 = 72%

Beam Loads per inch run on Spars.

Flight Condition	Case	Spar	Net Load per in. on Wing	Load Factor	% carried by Spar	Net Load per in. run
H.I.	A	Front	3.93	6.9	68	18.45
		Rear	3.93	6.9	32	8.7
	B	Front	4.43	6.9	68	20.8
		Rear	4.43	6.9	32	9.8
L.I.	A	Front	3.93	4.5		
		Rear	3.93	4.5		
	B	Front	4.43	4.5		
		Rear	4.43	4.5		
I.F.	A	Front	3.93	2.76	68	—7.38
		Rear	3.93	2.76	32	—3.47
	B	Front	4.43	2.76		
		Rear	4.43	2.76		

The net load per inch run on each spar is found by multiplying the net load per inch on the wing by the load factor and the percentage carried by the spar.

Computations of Moments, Shears, and Reactions.

The next step in the analysis is the computation of moments, shears and reactions on each spar under each net load per inch run as listed in the above table. The simplest way

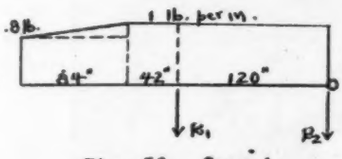


Fig. 56 - Case A

of doing this is to calculate these quantities for both Case A and B by placing a unit load on the spar and to increase the results obtained in direct proportion to the actual net loads per inch run on the spar for each condition.

Case A (Fig. 56)—Unit Spar Loading.

$$M_1 = 42 \times 1 \times 21 + 84 \times .8 \times (42 + 42) + \frac{84 \times (1 - .8)}{2}(42 + \frac{84}{3})$$

$M_1 = 882 + 5650 + 616 = 7148$ inch lb.

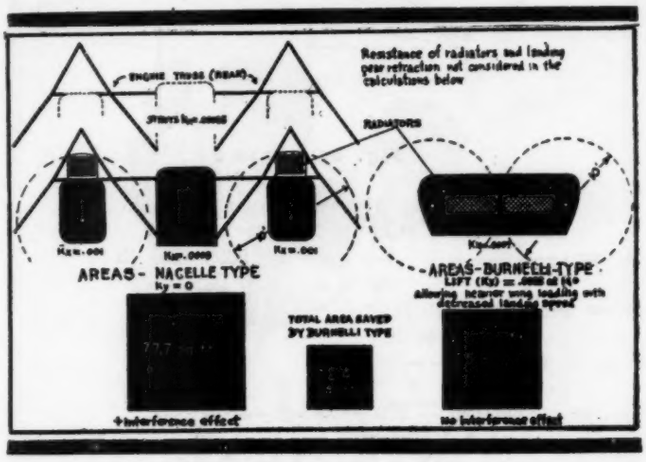
$M_2 =$ zero (pin-jointed)

$$S_{-1} = 84 \times \frac{.8 + 1}{2} + 42 \times 1 = 117.6 \text{ lb.}$$

$S_{+1} = -7148/120 - 120 \times \frac{1}{2} = -119.6$ lb.

$R_1 =$ 237.2 lb.

CONTROL



THE following test pilots have contributed to the demonstration of satisfactory control and advancement in design of the Burnelli airfoil fuselage multiple engined type through the operation of the giant RB1 and 2. Bert Acosta, Clarence Coombs, Randolph Page, Lloyd Bertaud, Edward Stinson, Howard Rinehart, George Pond, Romer Weyant, Homer Berry and Earl White.

Some Advantages of the

BURNELLI TYPE

Accessible multiple engine compartment
Extensive reduction of head resistance
Reduced turning moment on one engine
Fuselage lift reduces landing speed
Increased capacity of the fuselage
Structural efficiency and simplicity
Practical Landing Gear Retraction

LANGLEY-BURNELLI

247 PARK AVENUE, NEW YORK CITY

$S_{-3} = 120 \times \frac{1}{2} - 7148/120 = 0.4$ lb. $= R_3$ (since $S_{+3} = 0$ due to pin-joint)

Check: $R_1 + R_3 = 237.2 + 0.4 = 237.6 = 117.6 + 120 \times 1 = 237.6$

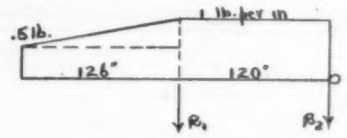


Fig. 57 - Case B

Case B (Fig. 57)—Unit Spar Loading.

$$M_1 = \frac{126^2 \times .5}{2} + \frac{126^2 \times .5}{2 \times 3} = 5293 \text{ inch lb.}$$

M_3 = zero (pin-jointed)

$$S_{-1} = 126 \times \frac{1 + .5}{2} = 94.5 \text{ lb.}$$

$S_{+1} = -5293/120 - 120 \times \frac{1}{2} = -104.1$

$R_1 = 198.6$ lb.

$S_{-3} = 120 \times \frac{1}{2} - 5293/120 = 15.9$ lb. $= R_3$

Check: $R_1 + R_3 = 198.6 + 15.9 = 214.5 = 94.5 + 120 \times 1 = 214.5$ lb.

Bending Moments and Reactions on Spars.

M_1 under 1 lb. per inch load is obtained for each case from the solution of the beam for moments, shears, and reactions made just above (Figs. 56 and 57). The net load per inch run for each flight condition is taken from the table "Beam Loads per inch run on Spars". Multiplying the unit M_1 by the load per inch on the spar will give the actual moment on each spar for each condition.

The actual R_1 is obtained in the same manner.

Moments.

Case	Spar	M_1 under 1 lb./in.	H. I. Load per in.	H. I. M_1	L. I. Load per in.	L. I. M_1	I. F. Load per in.	I. F. M_1
A	Front	7148	18.45	132,000				
	Rear	7148	8.7	62,100				
B	Front	5293	20.8	110,000				
	Rear	5293	9.8	51,800				

Reactions

Case	Spar	R_1 under 1 lb./in.	H. I. Load per in.	H. I. R_1	L. I. Load per in.	L. I. R_1	I. F. Load per in.	I. F. R_1
A	Front	237.2	18.45	4380			—7.38	—1750
	Rear	237.2	8.7	2062			—3.47	—824
B	Front	198.6	20.8	4130				
	Rear	198.6	9.8	1947				

It is to be noted that the inverted flight loads are negative since they are acting down. The inverted flight loads were found for Case A only, because these loads design the wing struts and it is desired to show how this is done. Inverted flight loads put compression in the wing struts and as these struts are very long, this condition is usually the design condition.

Lengths and Components of Wing Struts.

Member	V	H	D	V^2	H^2	D^2	$L^2 = V^2 + H^2 + D^2$	L
Front Strut (AC)	60	120	21	3600	14,400	441	18,441	135.8"
Rear Strut (BC)	60	120	21	3600	14,400	441	18,441	135.8"

At the points of attachment of the wing struts to the wing (A and B) there are reactions R_1 pulling up in high and low incidence and pushing down in inverted flight. This reaction puts the wing struts in tension when pulling up and in compression when pushing down. The loads in the struts may be obtained by multiplying the reaction by the length of the strut divided by the V component, both of which may be obtained from the table above. The loads in the wing struts have a horizontal component which imposes an axial load on

Patented and Patents Pending

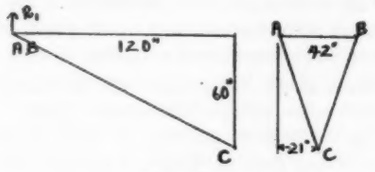
Yes, ALL METAL, but the Tires

3 *Passenger, Model C,* 0X5 *Motor,* $2,950

LENERT AIRCRAFT CO.

Pentwater, Michigan

the spar. The amount of this axial load may be obtained by multiplying the load in the strut by its horizontal component divided by its length. That is, by H/L as obtained from the table above. Also, in this particular plane, the struts are not



Wing Truss

Fig. 58.

parallel to the spars and so they impose drag and anti-drag loads on the wing. These loads are obtained by multiplying the load in the strut by D/L as obtained from the table above. Loads acting forward on the wing are anti-drag loads and are given a negative sign.

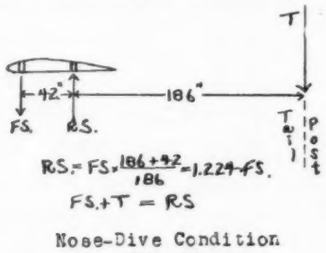
The table directly following is filled in for the high incidence loads and the inverted flight loads for Case A. The wing struts must be designed by Case A and invariably it will be found that the inverted flight condition will be the design condition as in this case the wing struts are in compression.

Loads in Wing Struts—Spar and Drag Loads

Case	Truss	Loading Condition	Reaction R_1	Load in Strut $R_1 \times L/V$	Axial Spar Load Load in Strut X H/L	Drag Loads* Load in Strut X D/L
A	Front	H.I.	4380	9900T	8760C	——
		L.I.				
		I.F.	—1750	3950C	3500T	——
	Rear	H.I.	2062	4650T	4124C	——
		L.I.				
		I.F.	—824	1860C	1648T	——
B	Front	H.I.	4130	9330T	8260C	+1455
		L.I.				
		I.F.				
	Rear	H.I.	1947	4400T	3894C	—670
		L.I.				
		I.F.				

*Drag truss is designed by Case B only.

As stated before, in high and low incidence the reaction R_1 always acts up and the wing struts must pull down thus being in tension. As they pull down they also pull inward toward the fuselage thus putting a compressive axial load in the spars. In inverted flight, the reaction R_1 is down, the



Nose-Dive Condition

Fig. 59.

wing struts are in compression, and they push outward from the fuselage thus putting a tensile axial load in the spars. When the wing struts are in tension the front strut pulls back putting a drag load on the wing and the rear strut pulls forward imposing an anti-drag or forward load on the wing. This then explains the character of the stresses and the signs used in the table.

Nose-Dive Condition.

As may be seen from Fig. 59, in the nose dive condition, the loads on the rear spar (RS) are 1.224 times the loads on

"At last— I can *Fly!*"

THE big moment has arrived! Our hero has spent three minutes a day studying "Pleasant Paragraphs for Prospective Pilots"—and now Prof. Postman is handing him his diploma. Ah, the thrill of it—the heavenly bliss of this graduation day! But it won't be long now. Instead of a "post" graduate there's apt to be a post mortem if he ever gets his hands on the controls. . . .

This quaint little scene, frankly, is just about what some folks think of a correspondence course in Flying. *And I don't blame them.* Now what do you think of that?—coming from the president of a home-study Aviation school? . . . If you think it's odd, then you haven't a clear idea of what *Aviation Institute* is doing. And I sincerely do want you to know.

I Am NOT Teaching Flying by Mail

Nowhere in my advertising or literature do I claim to turn out *flyers.* My Course gives Aviation's *ground-work* to sincere men who cannot leave job or home to get class-room instruction. The Industry needs men who *know.* Time, equipment and the rendering of service are too valuable for guesswork or amateur tinkering.

My textbooks cover the theory of flight, plane construction, rigging, repairs, motors of all types, instruments, commercial management—essential knowledge that *every* man in Aviation, whether on the ground or in the air, must have to handle his job intelligently. Those students who then want to get into the flying end of the business are referred to the nearest good flying field where they receive special rates and make much faster progress because of my preliminary training.

I am eager to have *you* get my proposition straight from headquarters, so that you'll know exactly where and how I stand. I'll trade my book for your name and address. The coupon will grant me your courtesy. Many thanks.

Walter Hinton, *President*

Aviation Institute of U. S. A.

1115 Connecticut Ave.
WASHINGTON, D. C.

Mail Now for Facts

Walter Hinton, Pres., Aviation Institute of U. S. A., 1115 Connecticut Avenue, Washington, D. C. 109-D

Kindly send me a copy of your booklet outlining your home-study, "ground-work" course in Aviation.

Name .....

Street ..... Age.....

City..... State.....

the front spar (FS) and act upward. For equilibrium it is evident that the rear spar loads must equal the front spar loads plus the load on the tail (T). The loads on the front spar are taken as the final design loads on that spar for the inverted flight condition. The following table may be filled in to find all the necessary loads in the nose dive condition:

		I.F. & N.D. Front Spar	N.D. Rear Spar = —1.224FS
Case A:	Load per in. run	—738	+9.05
	M_1		
	R_1	—1750	2142
	R_2		
Case B:	Load per in. run		
	M_1		
	R_1		
	R_2		

The wing strut, spar and drag loads are found in the same manner as for the other three conditions:

Case	Loading Condition	Truss	Reaction R_1	Axial Spar Load: Load in Strut $R_1 \times L/V$	Axial Spar Load: Load in Strut X H/L	Drag Loads: Load in Strut X D/L
A	Dive	Front	—1750	3950C		
	Dive	Rear	2140	4840T		
B	Dive	Front				
	Dive	Rear				

Design of Wing Struts.

The wing struts must be designed by Case A in accordance with the requirements of the Handbook. Referring to the tables "Loads on Wing Struts" we find the maximum loads to be:

Front strut: Max. Compression — 3950 lb. — I.F. and N.D.
Max. Tension — 9900 lb. — H.I.
Rear strut: Max. Compression — 1860 lb. — I.F.
Max. Tension — 4840 lb. — N.D. (perhaps L.I. will have greater load when table is filled in.)

These struts are so tremendously long that they are invariably weakest under a compression load and must be designed as long columns by the Euler formula:— $P = c\pi^2 EI/L^2$.

We will assume the struts of this plane to be mild carbon steel (1025) with a value of E = 28,000,000. They are round tubes streamlined with spruce and are pinned at both ends thus having a restraint coefficient of unity (c = 1).

Design of front strut: We know all the quantities in the formula but the value of I. Solving for that:

$I = PL^2/c\pi^2E = 3950 \times 135.8^2/1 \times 3.14^2 \times 28{,}000{,}000 =$ .263 in.^{4} Referring now to Table 4 of Chapter 5 we find that a 2¼-.065 tube has an I value of .2665 in.^{4}. This is evidently a little more than we need and therefore this tube will do. Its margin of safety is .2665/.263 — 1 = .012. We must make a check to see if our tube will carry the maximum tension load. Referring to Table 5 of Chapter 5 the area of a 2¼-.065 tube is 0.4462 square inches. The strength of mild carbon steel is 55,000 lb. per sq. in. Thus the tube strength in tension is 55,000 × 0.4462 = 24,600 lb. As our tension load is only 9900 lb. the tube is well over strength in tension.

Design of the rear strut:

$I = PL^2/c\pi^2E = 1860 \times 135.8^2/1 \times 3.14^2 \times 28{,}000{,}000 =$ .124 in.^{4}

Referring to Table 4 again: a 2-.049 tube has I = .14299 in.^{4}
2¼-.035 tube has I = .14940 in.^{4}

Either tube is strong enough but it is probably preferable to choose the 2¼-.035 as it is lighter and has the same diameter as the front strut. Its margin of safety is .1494/.124 — 1 = .205. Its tensile strength is 55,000 × 0.2436 = 13,400 lb. which is well in excess of the 4840 lb. required by the nose diving condition.

DESLAURIERS CONSTANT SPEED PROPELLERS

For Driving Aircraft Radio Generators and Other Power Requirements

Used by Commander Byrd, on both of his epoch-making flights, also used on many other notable long-distance flights, functioning perfectly, at all times. Used by United States and foreign governments.

Operates at constant speed, regardless of air speed. Head resistance only 25% of fixed-pitch propeller, — weighs less than any other radio system,—rugged in construction and operation.

Full Details Upon Request

DESIGNED AND MANUFACTURED BY

DESLAURIERS COLUMN MOULD COMPANY, INC.

WOOLWORTH BLDG. NEW YORK CITY

Bulletin No. 105 will be sent upon request.

Loads in Drag Truss.

The drag truss is solved for the loads of Case B only. The loads on the drag truss are made up of two parts, first the chord loads distributed uniformly along the entire span of the wing, and second the drag and anti-drag loads due to the drag component of the lift struts. This latter load is a concentrated load at the point of attachment of the wing strut to the wing. The distributed chord loads are considered concentrated at the panel points. Wherever a compression strut is located is a panel point. The load on half the panel to either side of a panel point is considered concentrated at the panel point. At the extreme outer panel point the wing tip is considered the center of the panel. The drag truss will be solved for the high incidence condition to illustrate the method. The solution of the truss for low incidence and diving is the same excepting that the distributed loads act back in these two conditions and not forward as in high incidence. The drag truss must also be investigated for inverted flight but in this condition there is no distributed load—only the concentrated loads due to the wing struts.

Fig. 60 illustrates the solution of the drag truss for the high incidence condition. This is done by the simple analyti-

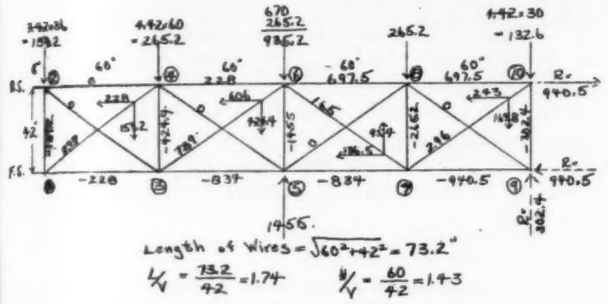


Fig. 60.

cal method of balancing all vertical and horizontal forces at each panel point. This method was explained in detail in Chapter 1.

The distributed chord load is taken from the table of paragraph 7 of this chapter under the design chord load for high incidence. The concentrated loads at the strut points are obtained from the table "Loads in Wing Struts".

Explanation of Drag Truss Solution.

When the loads on the drag truss have been properly placed at the correct panel points the solution of the truss may be begun. Starting at panel point 2 the load of 159.2 lb. must pass directly into number 1-2 since the other members at this point are 2-3 which is a wire and cannot take compression, and 2-4 which is at right angles to the load and consequently cannot take it.

Now referring to panel point 1 we have a load of 159.2 lb. pushing down. The wire 1-4 must pull up to maintain equilibrium in the vertical plane. The necessary load in the wire to do this is 159.2 × L/V which is 159.2 × 1.74 = 277 lb. This 277 lb. tension in the wire exerts a horizontal force at panel point 1. This horizontal component of the wire must be taken up by spar member 1-3 pushing outward. The amount of force necessary in the spar may be found by 159.2 × H/V which is 159.2 × 1.43 = —228 lb. The minus sign indicates compression.

Let us now move to panel point 4. In addition to the horizontal force of 228 lb. and the vertical force of 159.2 lb. exerted by wire member 1-4, we have a vertical panel load of 265.2 lb. Wire 4-5 is slack due to the vertical load of 159.2 + 265.2 = 424.4 lb. acting down. This vertical load goes directly into the compression strut 3-4. The horizontal

Dolfinite Products *for the* Aeronautic Industry

Dolfinite Water and Gas Resisting Cement

for use on riveted seams of gas tanks, creating a perfect seam and eliminating leaks. This material dries to an elastic film, allowing ample time for riveting without losing its adhesiveness.

Dolfinite Water Resisting Compound for Floats

a semi-drying material, applied to framework, eliminating costly operation of taping, can be laid on ribs with hand pressure gun quickly and economically. Will prevent rust and corrosion.

Dolfinite Water and Rust Proof Cement

is very desirable for attaching fabrics to wood, steel or duralumin. It is widely used in the manufacture of automobile bodies and has many uses in the manufacture of aircraft, especially enclosed cabin planes. Samples of these materials will be furnished to interested parties on request.

The
DOLPHIN
Paint & Varnish Company
"SINCE 1885"
Toledo, Ohio

component of the wire, 228 lb., is taken by tension in spar member 4-6.

At panel point 3 we have a repetition of panel point 1. The vertical load of 424.4 lb. is taken by wire 3-6. The load in the wire is 424.4 × 1.74 = 739 lb. The horizontal component due to the wire is 424.4 × 1.43 = 606 lb. This 606 lb. is taken in compression by spar member 3-5. But this member must also resist a compression force of 228 lb. being transmitted by spar member 1-3. Thus the total compression in member 3-5 is —606 plus —228 = —834 lb.

At panel point 5 the vertical load is transmitted directly to compression strut 5-6 putting 1455 lb. compression in this member. Both wires coming to point 5 are slack and so have zero load. The horizontal compression load of 834 lb. passes by the point into spar member 5-7 without changing.

At panel point 6 the resultant vertical load is 95.4 lb. upward. This is taken by wire 6-7 with 165 lb. tension. A horizontal tension of 606 plus 228 = 834 lb. is exerted by members to the left of the panel point. Wire 6-7 exerts a horizontal tension to the right of 136.5 lb. The difference between these tensions 834 — 136.5 = 697.5 lb. must be taken in tension by spar member 6-8.

Panel points 7 and 8 may be solved in similar fashion. The reactions at the end of the truss (indicated by dotted lines) are the forces which the fuselage must exert on the wing to maintain equilibrium.

Drag Truss—Summary of Loads and Design of Members

Member	H.I.	L.I.	Dive	I.F.	Max. or Des. Load	Material and Size of Member	Strength	M.S.
Drag Wires								
2-3	0							
4-5	0							
6-7	165							
8-9	0							
Anti Drag Wires								
1-4	277							
3-6	739							
5-8	0							
7-10	296							
Compression Struts								
1-2	—159.2							
3-4	—424.4							
5-6	—145.5							
7-8	—265.2							
9-10	—302.4							
Front Spar								
5-7	—834							
7-9	—940.5							
Rear Spar								
6-8	697.5							
8-10	697.5							

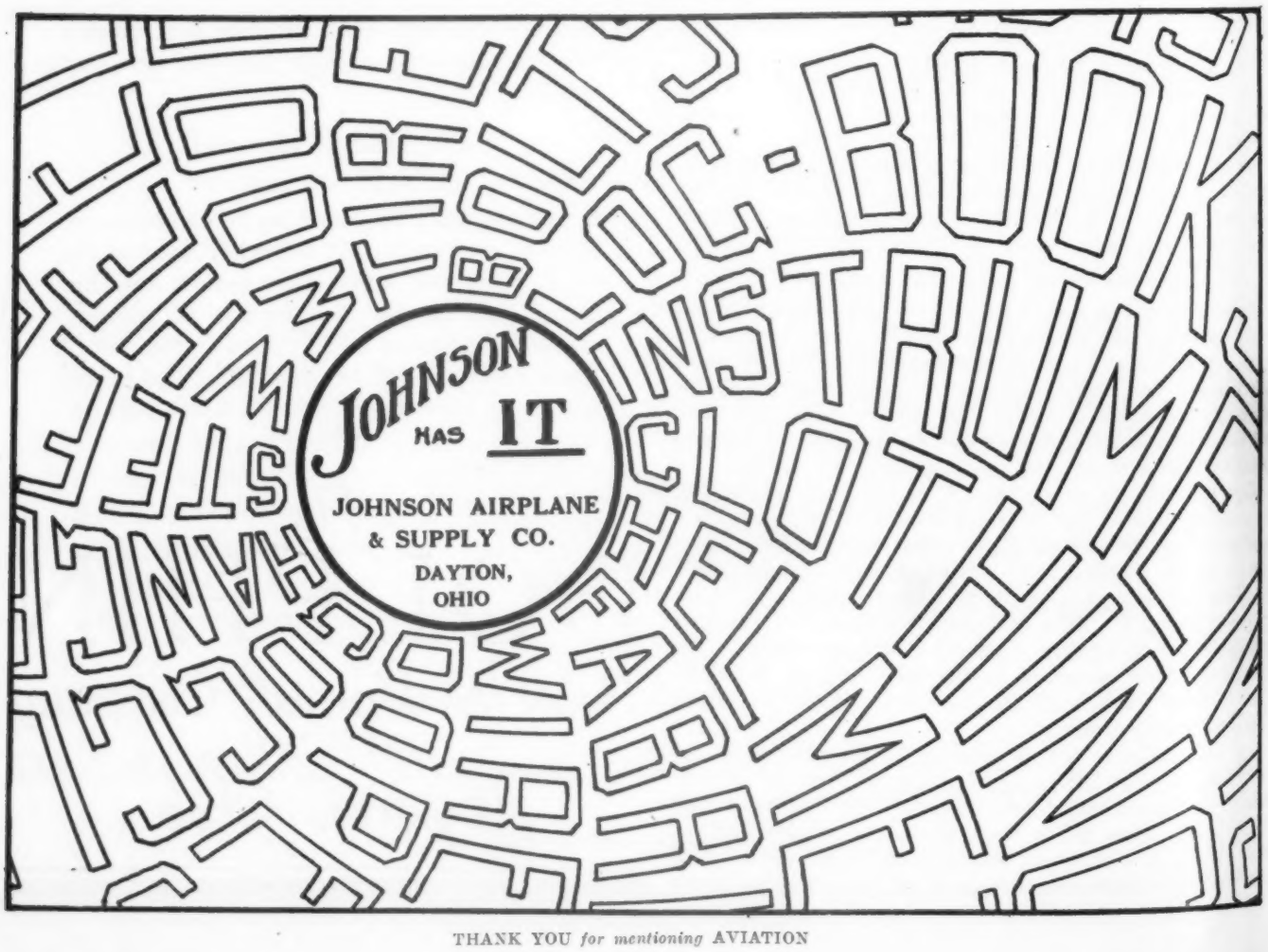
— indicates compression + indicates tension

In tabulating the above table the maximum load in each member is the design load for that member. For the drag and anti-drag wires round or square tie-rods should be used. The required size and strength of these may be obtained from Table 10 of Chapter 6. If double drag wiring is used each wire must be able to take 65% of the total design load for the both of them. For the ordinary wing consisting of spruce I or box spars with plywood or built-up ribs, the compression struts should be of spruce. The method of figuring these struts is given in the paragraph on Spruce Columns in Chapter 4. Fig. 41 of Chapter 4 gives the allowable load. The loads in the spars inboard of the wing struts were listed as they will enter into the calculations of the loads in the spars by the Precise Method.

In the next chapter the wing spars will be designed and the stresses in them investigated by applying the Precise Equations. This will complete the design of the wing and then we will go on to chassis and fuselage analysis.

Copyright Alexander Klemin

To be continued in the next issue of AVIATION.

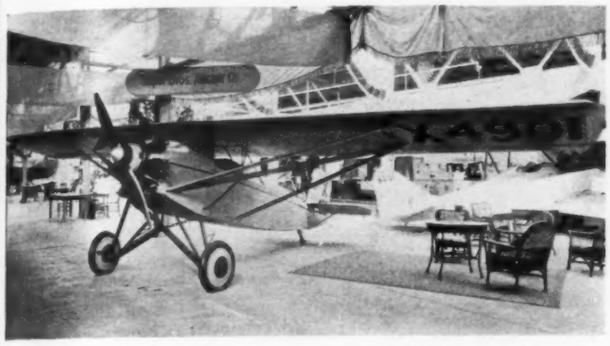


THANK YOU *for mentioning* AVIATION

A Designer's Impressions of the Detroit Show

Continued from page 1209

Excellent as appeared to be the performance of 200 hp. cabin airplanes, it does not seem to satisfy pilots any more. They carry sufficient load, at what we now call fair speed, but their take-off is comparatively slow and their climb appears to pilots to be sluggish. Also the high speed of 120 m.p.h. appears to be only fair. This performance seemed to be excellent only a year ago, but the craving for still greater speed and for snappier climb seems to be insatiable. This is



The Taylor "Chummy" monoplane powered with a 90 hp. Ryan-Siemens engine.

not surprising. We demand 8 cylinder, 80 hp. engines for automobiles just to save the trouble of shifting gears. So much more we are justified in demanding plenty of power in an airplane, as nothing contributes as much to its safety as quick take-off and rapid climb. And there is the question of preserving the engines by throttling in flight. It has been shown that ceiling of an airplane is proportional to the coefficient

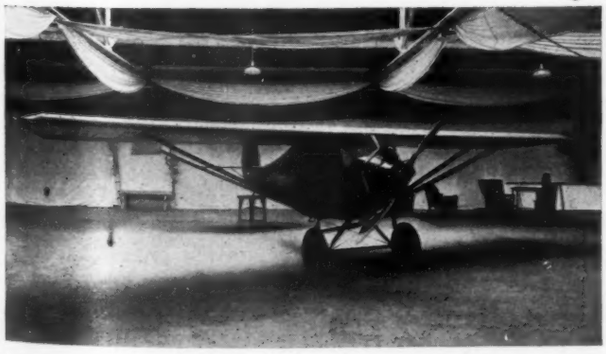
$$K = W/P\sqrt{W/A}$$

where W is weight in pounds

A — Wing area

P — Horsepower

When this coefficient reaches the value of 105, the ceiling is at sea level, i.e. the airplane is barely able to sustain itself in the air, at ground level. The smaller that this coefficient is the higher the airplane can climb, i.e. the more reserve power it has. Now, for 200 hp. monoplanes weighing be-



Front quarter view of the "Monocoupe" powered with the new Velie 70 hp. engine.

tween 3500 and 3900 lb. the coefficient is found to be in the neighborhood of 60, showing a fairly low ceiling and inability to throttle the engine very much. It is certainly a credit for the Wright Whirlwind that it stands up so well under these conditions.

The craving for higher speed, quicker take-off and climb,

Richard Walling, popular screen star and aviation fan wearing a Scully Helmet.

SCULLY

Air Mail Helmets

Designed and perfected after many tests by air mail pilots.

Made from Finest Imported Leathers

SCULLY BROS., Inc., 725 E. Washington St., Los Angeles, Cal.
Manufacturers and Distributors for the West

NICHOLAS-BEAZLEY AIRPLANE CO., Marshall, Mo.
Distributors for the United States from Denver East.

SOUTHERN AIRWAYS, Inc.

Allied Schools

Home Study Course $25	**DALLAS AVIATION SCHOOL**
Primary $150	Distributors for Lincoln Page in Texas and Oklahoma. Office at Hangar No. 6, Love Field, Dallas, Texas.
Advanced $250	**SAN ANTONIO AVIATION & MOTOR SCHOOL**
Commercial $750	Located between the Government's two largest training schools.
Transport $1500	**INTERNATIONAL COLLEGE *of* AVIATION**
You can begin any time. Write for reservation.	Practical Science of Aviation in ten lessons. This course is free if followed by flying course in either of our schools.

SOUTHERN AIRWAYS, Inc.

Swallow Distributors for Texas and Mexico.

Airplanes, motors, parts, supplies, wings, propellers, supplies, etc. Trade in your old equipment. Used motors, planes and parts accepted as cash in purchase of new Swallows, Lincoln Pages or Fairchild Monoplanes. Equip your plane whether old or new with the new vacuum muffler.

210 College Street, SAN ANTONIO, TEXAS

Every Pilot *and* Executive

SHOULD HAVE the facts on Aerol Shock Absorbing Struts.

—They make landing comfortable — always.

—They make forced landings less hazardous.

—They protect the plane and cut maintenance cost.

Write today for illustrated booklet.

CLEVELAND PNEUMATIC TOOL CO.
3737 E. 78th St., Cleveland, Ohio

AEROL *shock absorbing* STRUT

MILESTONES OF PROGRESS

$500,000 Worth of Swallows

SINCE January 1st., 1928, the Swallow Company has taken orders for a half million dollars worth of Swallows for 1928 delivery.

To meet this fast growing demand, new factory buildings have been added—quadrupling the production facilities of 1927.

If you are planning to go into the airplane business as a dealer and have not found out what the Swallow dealership has to offer, you are overlooking a good bet. Wire or write us today and we'll tell you all about it.

SWALLOW AIRPLANE CO.
WICHITA, KANSAS

and for larger reserve of power resulted in the production of airplanes of about the same type as the one described above, but equipped with Wasp engines of 425 hp. The carrying capacity was increased only very little—from 5 or 6 to 6 or 8 passengers, and total weight of loaded airplane was increased to 4700 or 5000 lb., while the horsepower was doubled. This resulted in a decrease of the coefficient K to about 45, showing a much higher reserve of power. Three airplanes of this type were exhibited at the Show—the Fokker "Super-Universal", the Halpin "Flamingo", and the Hamilton "Silver Streak". The manufacturers claim for their performance 135 to 140 m.p.h. as a high speed, a climb of 1000 ft. the first minute and an absolute ceiling of 20,000 ft.

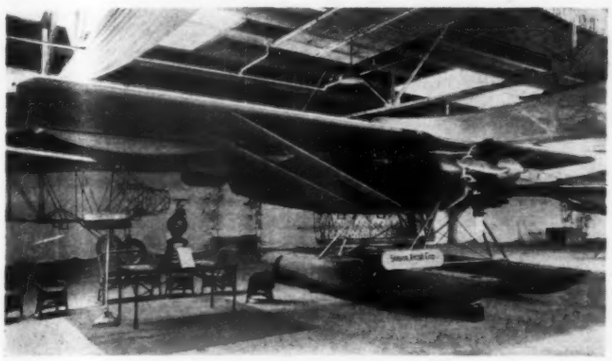
The Fokker "Super-Universal" hardly needs any description, as its prototype the "Universal" is so well known. Suffice it to say that it is of typical Fokker design with steel tube fuselage and very thick plywood covered wing. The fact that it is fully cantilever and of somewhat larger size distinguishes it from the "Universal" which, it will be remembered, had braced wings.

The Halpin "Flamingo" is of quite new design and deserves considerable attention not only because it is a representative type of this new class of 4700-5000 lb. Wasp engined cabin monoplanes, but also because it is of all metal construction. In general layout it is quite similar to Whirlwind engined monoplanes in that it has wings of uniform section braced by struts extending from the bottom of the fuselage, the front strut also acting as support for the landing gear. Even in dimensions it differs but little, having the span of 48 ft. as against 46 ft. 4 in. for the Bellanca, for instance. Its main points of interest are in detail design and construction. The fuselage, while of welded steel tubing construction, is covered entirely with duralumin. The small clips are

The Wallace "Touroplane" with wings folded. The engine is an 80 hp. Anzani.

welded at intervals to the fuselage tubes, to these are attached light duralumin channels, to which in turn the covering is riveted. The covering is of essentially flat sheet, with widely spaced corrugations or "beads" provided for stiffness. Although only .014 in. thick, it appears to be perfectly rigid. The wing being of braced type, the wing beams are made of uniform section throughout their length. They are of the I beam type, consisting of vertical web 3/32 in. thick with angles riveted on upper and lower edges. The web as well as the angles are of duralumin. The ribs, consisting simply of the flat sheet of metal, are riveted to the spar webs. The covering is applied in sections with the edges flanged, so that edges of two sections clamp the rib between them and all three are riveted together. The construction is very simple and the external inspection discloses a very small number of rivets. The "Flamingo" was finished just before the Show and was flown from Cincinnati to Detroit after only a few minutes' testing. Such a rush probably accounts for the lack of finish which put it at some disadvantage when compared to highly finished Fokker and Hamilton machines as far as impressions of the visitors go.

The Hamilton "Silver Streak" is probably the most interesting and audacious design of the airplanes exhibited in Detroit. To those expecting to see the machine similar to the one flown in Ford Tour of 1927 it came as a big surprise. All metal, and practically all duralumin in construction it has cantilever wings of 54 ft. in span and of seemingly moderate thickness. The wings are hinged at the fuselage to be sure, and are supported by a pair of struts on each side, but the attachment of struts is not far from the root. Indeed, the only purpose of these struts is to avoid obstruction of the cabin by the deep beams necessary in a cantilever wing. As it is, the wing beam structure is made to taper to the upper surface of the wing on length from the strut attachment point to the fuselage, and the hinge fittings are

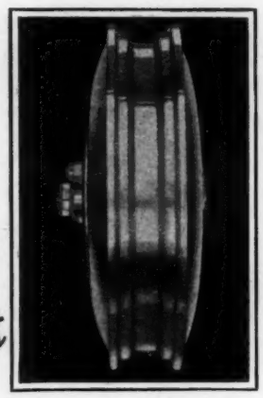


A Stinson-Detroiter monoplane powered with a Wright Whirlwind and fitted with pontoons.

located at the very top of the fuselage. The top member of the fuselage frame, therefore, transmits only direct compression or tension and does not have to be of large size. The cabin, therefore, seating from 6 to 8 people including the crew is exceptionally free from obstructions. The landing gear consists of the axle and brace, or radius rod, hinged at the lower longeron of the fuselage at the fittings to which the wing struts are also attached. The weight is taken by Oleo Shock absorbing struts attached to the axle at the wheel on the lower end and extending vertically to the attachment of the front strut to the wing. The whole layout is very neat and, in combination with long tapered wings, gives the plane appearance of unusual fineness.

The wings, as well as the fuselage and tail surfaces, are covered with corrugated "Alclad" which is buffed, giving the machine a quite finished and very attractive appearance.

The six to eight passenger cabin monoplanes with Wasp engines, weighing fully loaded from 4700 to 5000 lb., represent a quite new and distinct development. The first "Super-Universal" was produced less than one year ago, and "Flamingo" and "Silver Streak" were barely finished in time for the Show. While this type is quite new, its future success is assured by previous experience with 200 hp. monoplanes, and by the fact that it is in line with the craving for speed and power manifest in all methods of transportation. It is very gratifying to see that two out of the three machines of this class were built out of metal. The use of light metals in airplane construction makes a very steady and evident progress, and there is little doubt that all large machines, and many small ones, in the future will be built of light metals. There is only one objection, which applies to all three machines of this class at the Show, and this is extreme narrowness of the fuselages. While we neglected this narrowness and crampiness of cabin in a 200 hp. machine selling for $10,000, we can hardly tolerate it in a 400 hp. one selling for $20,000. Moreover, we fail to see the reason for this narrowness, except mere tradition. With the large frontal area of the Wasp engine, the parasite resistance would be reduced, it seems to us, by bulging the sides of the fuselage,



Perfect

STREAMLINE

ADDED side-load strength and better appearance are inherent in the perfect streamline form of the Bendix-Ladden Wheel for airplanes.

Each wheel has a self-contained brake unit—the famous Bendix Servo Brake.

Rim form, axle diameter and length, and other specifications of this wheel follow the standards established by the U. S. Air Corps.

Bendix Wheels and Brakes are now in production in standard sizes.

BENDIX BRAKE COMPANY
General Offices and Plant: South Bend, Ind.
Division of Bendix Corporation, Chicago

BENDIX 4 BRAKES
FOR SAFETY

For High or Low Compression Engines

B. G. "HORNET"
MICA SPARK PLUGS

B. G. HORNET mica spark plugs have *proven* their absolute dependability in both high and low compression engines. A set of 18 plugs weighs less than 33 ounces. The reproduction on the right is the exact size.

The B. G. Corporation
136 West 52nd Street
New York City

Contractors to the U. S. Air Corps and Aircraft Engine Builders.

BG

Ireland "NEPTUNE" Amphibian

High Speed full load ..... 95 m.p.h.
Landing Speed full load ..... 46 m.p.h.
Pay Load .....750 Lbs.

Orders will be filled in sequence of receipt

Price $14,600

IRELAND AIRCRAFT, INC.
GARDEN CITY, N. Y.

The American Eagle **Knows no Defeat *in* Performance contests—**

Neither has it ever had a Structural Failure

Brilliant performance; amazing maneuverability; rugged, dependable construction together with its dazzling beauty of design and finish have firmly established *The American Eagle* as

"Master of the Skies"

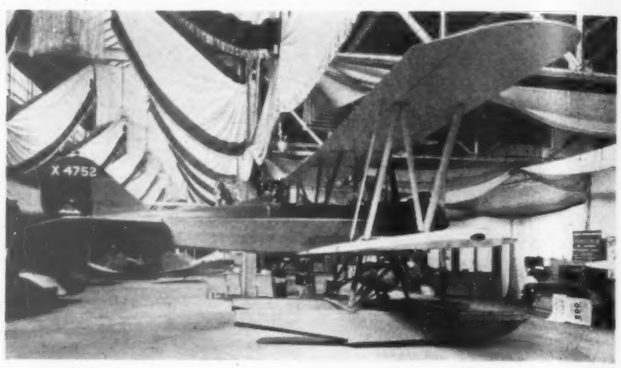
With welded seamless steel tube fuselage and tail surfaces, selected spruce and laminated mahogany wing construction, its safety factor is far beyond Department of Commerce requirements, which is responsible for the remarkable record of never having had a structural failure.

Manufactured under Approved Type Certificate No. 17
Send for Catalog and prices

American Eagle Aircraft Corporation
2806 East 13th Street
Kansas City, Missouri

and by making a nearer approach to the shape of a good streamline body.

Another very interesting group of airplanes at the Aircraft Show was formed by the seven two-seater airplanes with 6 to 100 hp. engines and with weight ranging from 1200 to 1500 lb. when fully loaded. Two of these airplanes seem to have been in existence for somewhat more than a year. Five others apparently were produced a short time before the Show. There was little precedent for the airplanes of this type in America, and the presence of six machines of this type at the Show one is liable to classify as a spontaneous growth. This being the case, it is difficult to ascertain whether there is any demand for these machines, and what can be expected in the future. It should not be forgotten, however, that a two-seater airplane of 80 hp. is a very old type. It was the type used by Allied air forces in 1914. During the last three or four years this type was revived abroad with astonishing success. The DeHavilland "Moth" is now used for training by many flying clubs in England and Canada. The Czechoslovakian "Avia" made some notable non-stop flights from Prague to Paris and return, and an Avro "Avian" was recently flown from London to Australia by Hinkler. In America the development of this type was retarded by great success of the 3 seater type, which used OX-5 engines and was sold at a very low average price of about $2500.00. The two seater light airplane depends on the existence of a light air-cooled engine of modern production and therefore cannot be sold at such a low price. The machines at the show were listed at around $3500.00 or about $1000.00 more than three-seater machines with an OX-5. The supply of OX-5 engines, however, shrinks fast, and with new production engines of 120 hp. the price of three-seater machines jumps to almost $6,000. This being the case, there will be a place for the two-seater type and we may look with some confidence on its future development and success.



Side view of an Alexander Eaglerock (Wright Whirlwind) fitted with pontoons.

Being the result of almost spontaneous growth and not having been yet passed through the purifying process of competition, the machines of the two seater class vary widely in their conception and arrangement. The only common feature apparently is that all of them are monoplanes. The size varies from 30 to 34 ft. in span, 20 to 22 ft. in overall length and 120 to 170 sq. ft. in wing area. Five out of seven machines have side by side seats, one has staggered seats, and one is in tandem. Four out of seven machines have open cockpits and three are cabin jobs.

The Central States "Monocoupe" is probably the oldest and best known machine of the light two-seater class. In its general conception it appears to be a reduced size model of the successful monoplanes of the 200 hp. class. A very deep fuselage makes a comfortable cabin with side by side seats. Single controls are used and the passenger's seat is arranged slightly farther back than the pilot's. The wing panels are hinged at the top of the fuselage and are braced by struts

extending from the bottom longeron. Next in chronological order comes the Mohawk "Pinto"—a bold design and a dashing looking machine. It is a full cantilever low wing monoplane with tapered wings. The open cockpit accommodates two staggered seats and single controls. The provision of staggered seats, while allowing a somewhat narrower fuselage than would be possible otherwise, requires a very large cockpit opening, which furthermore is cut very deep on the sides of the fuselage. While this large opening makes for easy entrance into the cockpit, one can doubt the degree of protection it affords to the occupants. At any rate, this is the only feature which mars an otherwise very clean appearance and apparently high aerodynamic fineness of this machine. The E. P. Hurd Monoplane is of low wing braced type with bracing struts extending from the top of the fuselage to about midway between wing root and tip. The wing of conventional wood and fabric construction appears to be fairly thick and is of uniform section. The fuselage is narrow and two open cockpits are arranged in tandem. The machine is equipped with dual control, and indeed appears to be of very practical type for training. The open cockpit tandem arrangement is the type used for training all over the world and while side by side arrangements were repeatedly proposed for this purpose, they did not succeed in obtaining any popularity. The low wing feature is known to facilitate landing because of "ground" or "cushioning" effect of wings. Cantilever wings of uniform section probably have wing tips strong enough to stand a good deal of abuse, and in any case are very easy to repair.

The Simplex "Red Arrows" are side by side monoplanes with wings of uniform section attached at the middle of the fuselage and fully braced with struts attached to the landing gear. The location of the wing in this position obstructs the vision more than the low wing does, and the combination of wing bracing and landing gear produces an impression of excessive amount of parasite resistance. Two models of this make were shown, one with an open cockpit, another with fairing and celluloid windows built up to form a good cabin.

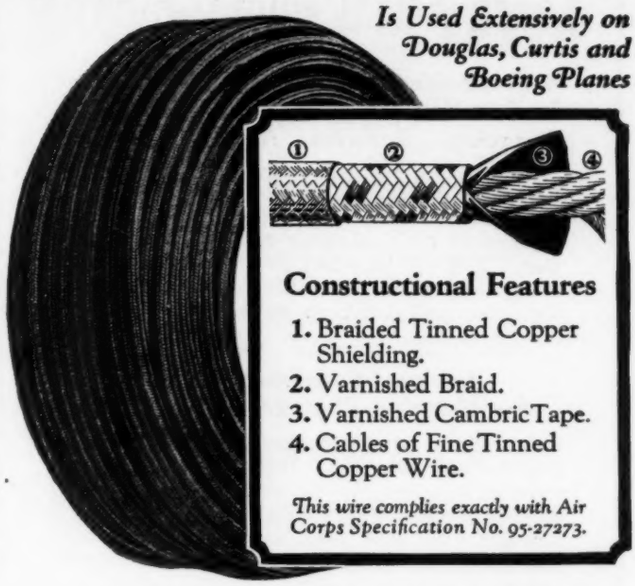
The Taylor "Chummy" is on the upper limit of the airplanes of this class as far as size and weight goes. Its span

The Aero-Craft "Aero Coupe" powered with a 110 hp. Warner "Scarab" engine.

is 34 ft., wing area 170 sq. ft. and it weighs 1500 lb. fully loaded. It is of pure parasol type with wings of uniform thickness well braced by struts extending from the lower longerons of the fuselage. The fuselage is wide enough to accommodate pilot and passenger side by side, and complete dual controls are provided, including two throttle levers so that both instructor and student can use a left hand throttle. The cockpit is entered by side doors extending for the full height on either side of the fuselage. This is made possible by extending some struts in front and in rear of the cockpit to the wing, which at this place acts as upper longeron of the fuselage. The cockpit is very comfortable and the seat and controls seem to be proportioned just right. Although admitting that side by side airplanes have failed so

Belden Radio Shielded Wire

Is Used Extensively on Douglas, Curtis and Boeing Planes



Constructional Features

1. Braided Tinned Copper Shielding.
2. Varnished Braid.
3. Varnished Cambric Tape.
4. Cables of Fine Tinned Copper Wire.

This wire complies exactly with Air Corps Specification No. 95-27273.

Belden Manufacturing Co. 2308-B S. Western Ave. Chicago, Illinois

Specify Belden

Write Belden Airplane Engineers for data on Belden complete airplane wiring—also specially designed airplane harnesses

HALL-ALUMINUM AIRCRAFT CORPORATION

Successors to Airplane Business of
CHARLES WARD HALL, INC.

STRONG LIGHT-WEIGHT
ALL-METAL
AIRPLANES *and* SEAPLANES

Standardized Drawn Sections and Stamped Parts

2050 ELMWOOD AVENUE
BUFFALO, NEW YORK

Contractors to U. S. Navy

Learn Aerial Photography !

A Profitable and Fascinating New Profession. Your Services Required by News Agencies, Business Institutions, etc.

WHEN you have completed our fascinating course in aerial photography you will be an experienced aerial observer and expert photographer. You will have had many flights over interesting country and you will be qualified to handle big orders and derive an attractive income from this profession.

Business Concerns Use Our Air Mapping Photographic Services

Many of the largest business institutions on the Pacific Coast have found that it pays to have us make aerial views, surveys, and maps of their present, or prospective properties, with or without contours. We give them authentic information and save them hundreds of dollars in time and money.

Inquiries Solicited

ERICKSON
The flying photographer
68 Sefton Block, San Diego, California

We have been in this business for 16 years

Stearman Aircraft

are built with the conviction that economy in the operation of an airplane is fundamentally a matter of ultimate cost per flying hour, and that while these hours are accumulating the pilot and passenger should have every convenience and comfort within the limits of feasibility.

THE STEARMAN will carry 400 lbs. pay load with a fast cruising speed, a high speed with reserve power.

THE STEARMAN is equipped for both day and night flying.

THE STEARMAN has *proven* a dependable ship, having maintained a wonderful schedule in the air mail service under all adverse weather conditions. The standard equipment of two prominent contract air mail operators is now predominantly STEARMAN.

ANY ONE OF OUR FOUR OFFICES will be glad to assist you in determining the adaptability of the STEARMAN to your requirements.

Let Us Send You Detailed Information

603 Bedell Bldg., Portland, Ore.

226 Noble Bldg., Boise, Idaho

U.S. MAIL
Varney air lines

904 White Bldg., Seattle, Wash.

310 Balboa Bldg., San Francisco, Calif.

ASK THE PILOT WHO FLIES ONE

far to obtain general recognition as training machines, one is nevertheless tempted to give the case another trial when one sits in the cockpit of the Taylor "Chummy". It can be remarked that the parasol type is undoubtedly the most pleasant one for cross-country flights, as one can have unobstructed view of the countryside. In case of a poor landing or forced landing in a bad place followed by turning over, the parasol certainly offers best protection for the occupants.

To complete the review of light two-seater airplanes, we must mention the Jack Stinson cabin monoplane. It would deserve much more than mere mentioning, were it not for the fact that the completed machine was not exhibited and only a skeleton of the fuselage with wings was shown. One can gather that this will be a side by side cabin training machine, following in general lines the type so familiar on 200 hp. machines. The idea of building and using a cabin airplane specifically for training purposes is quite novel, and may be open to some criticism.

The remaining part of the exhibition was composed of the airplanes of highly speculative type as far as their practical utility and future success goes. The availability of light air cooled engines of about 100 hp. and of very light weight was responsible mostly for their existence. Their general tendency was to utilize the light weight of these engines for increase of useful load rather than for increase in performance. This tendency resulted in production of a variety of three and four seater airplanes with such engines as 10 cylinder Anzani, 7 cylinder Siemens or new Warner "Scarab". Some of these airplanes are biplanes, some are monoplanes and all are of the cabin type. Generally they represent little interest, being apparently built with little knowledge of aeronautical engineering, crude workmanship and indifferent finish. As an outstanding exception we can mention the Stinson four seater cabin monoplane with Warner "Scarab" engine, which has all the characteristic features of larger Stinson monoplanes. It may happen that some of the airplanes of this class will gain recognition, but this is rather doubtful. The general tendency of our time is towards higher power and performance. One is rather inclined to think that eventually 200 hp. engines will be used on four seater cabin airplanes and 400 hp. engines will take their place on six seater ones.

In this respect the Cessna monoplane seems to show the movement in the current direction. Very light in weight, and moderate in size, this four-seater monoplane represented one of the most attractive airplanes at the Show. It departs from convention design in that it is full cantilever monoplane with tapered and rather thin wing covered with plywood. The landing gear is attached directly to the lower longerons of the fuselage, and not a single strut is found above this level. The whole machine looks very refined and one can easily believe that it attains a speed as high as 140 m.p.h. The fuselage is of small size and very compact.

It would be an unpardonable omission to close this review without mentioning the representation of seaplanes in the All-American Aircraft Show. Out of 58 airplanes exhibited, there were 9 seaplanes, all of quite modern type. Of these six were of twin float type, one was a flying boat and two were amphibian flying boats. In addition there were exhibited individual floats of three different makes, suggesting the possibility of converting many other airplanes into seaplanes if need arises. As a matter of fact, all of the float seaplanes exhibited at the Show were of the convertible type, and the float seaplane invariably was exhibited alongside of a similar machine equipped as a landplane.

It is interesting to note that all the floats and boat hulls were of metal construction. All three manufacturers of the floats used metal for framing as well as for covering, while all three flying boats had metal covering applied to wooden framing.

Side Slips

By ROBERT R. OSBORN

The committee has unanimously awarded this Week's Prize for Increasing Enthusiasm to the advertising manager for the All-American Aircraft Show for his statement,—"The year's biggest event in aircraft history."

• • • •

We hate to have to do any criticizing of the management of the recent flight of the "Bremen", when everyone else has been praising the project, but we must say that this business of preparing so secretly, taking off so suddenly and landing on some unknown dot on the landscape certainly left the newspapers in an awful fix. In rushing to press they had to run pictures ranging all the way from the new British "Calcutta" flying boat to a Waco Ten with "Bremen" lettered thereon. One artist must have been holding up an edition, as his lettering of the name wasn't all on the plane, the final "N" being supported by a tree in the background. Another prominent newspaper must have sold its stock of airplane pictures short, as it was reduced to printing a picture of the ocean as it exists near Labrador.

Seems as if the Society for the Aeronautical Education of Artists, of which we are still founder, president, and sole member, might have to have another indignation meeting.

• • • •

At the time of this writing the reports from Greenely Island state that the fliers are staying with the light-house keeper but all are complaining of the cold. This makes it appear that the light-house keeper hasn't read the chapter, yet, which deals with the etiquette of presenting pajamas to trans-Atlantic fliers.

• • • •

The fact that the Junkers monoplane was so badly damaged in landing brings home to us the point that trans-Atlantic flying can never be practical until Greenely Island has more and better landing fields. Suggestions for the editorial staff, —"The Crying Need for Landing Fields on Greenely Island." "Inactive Greenely Island Chamber of Commerce Delays Trans-Atlantic Service."

• • • •

We think the prize news item among the great number that described the flight of the "Bremen" was the one in the New York morning newspaper which explained what was meant by an "intermediate landing" at Greenely Island. An intermediate landing, it seems, is one which differs from a three-point landing in that the wheels touch before the tail skid does.

• • • •

Another New York morning newspaper was a close second with its description of how the intrument board lights went out leaving the plane absolutely dark,—"The motor droned on, hissing as the cold sleet struck the heated surfaces, but never missing a beat. This continued for four hours while Baron Von Huenefeld worked like a madman to repair the lighting system. Suddenly it winked on, the three gazed feverishly at the instrument board and saw that they were 400 miles off their course."

That Miles-Off-Your-Course-Indicator should be on every instrument board, we'd say.

• • • •

One paper ran a two-inch screamer headline across its front page "Baron Was Ready To Kill His Crew". We didn't know that was news. We've often had that urge ourself, but so far have always compromised on merely telling them what we thought of them.

FUEL GAGES

"Triumph"

Magnetic **Aircraft** *Gages*

Will Register Accurately the Amount of Fuel on Hand Regardless of Tank Location. *"Triumph"* Gages are Simple, Light, Strong, Neat, and Leak-Proof.

Manufacturers of

Liquid Level Gages

for 25 Years

"—Let's get together"

THE BOSTON AUTO GAGE CO.

PITTSFIELD, MASSACHUSETTS

AIRPORTS

SURVEYS

DESIGNING

CONSTRUCTION

A Complete Service Backed by Twenty Years Aviation Experience

B. RUSSELL SHAW CO.,

INCORPORATED

ARCADE BLDG. ST. LOUIS, MO.

1928 CHALLENGER — OX5

THE Challenger early won approval because of its exceptional performance, sturdy construction, and the easy accessibilitiy of all parts requiring inspection or servicing.

The 1928 Challenger, incorporating numerous refinements that give it improved performance and appearance, will be on display at the All-American Aircraft Show.

Challenger Aircraft

Approved Type Certificate No. 19

Price $3100.00 at Factory.
Complete less engine, $2400.00.
All prices subject to change.

KREIDER - REISNER AIRCRAFT CO.
Incorporated
HAGERSTOWN MARYLAND

LINDBERGH FIELD "AMERICA'S FINEST AIRPORT"

Is Now Under Construction In

San Diego California

"THE AIR CAPITAL OF THE WEST"

Attractive factory sites, San Diego's *unequalled* climate for year 'round flying, testing and manufacturing, plenty of skilled labor at reasonable wages, the support of this progressive "air conscious" city, and many other advantages are offered to aircraft industries in San Diego. *Inquiries solicited.*

Write to INDUSTRIAL DEPARTMENT
Chamber of Commerce
790 Chamber of Commerce Bldg., San Diego, California

ALUMINUM TANKS

ALL TYPES

FOR PRODUCTION ALSO SPECIAL DESIGNS
PROMPT DELIVERIES ANY QUANTITY

Mail us your specifications

HOLCKER MANUFACTURING CO.
Kansas City, Mo.

FOREIGN NEWS

By Special Arrangement with the Transportation Division Bureau of Foreign and Domestic Commerce

Fairchild Airport in Canada Always Open

Fairchild Aviation Limited of Grand 'Mere, Quebec, Canadian subsidiary of the Fairchild Aviation Corp. of America, reports that its airport situated on Lac a la Tortue, two and one-half miles east of the city, is always open to visitors.

A marine railway is available for beaching both seaplanes and boats, and mooring buoys, fuel, light repairs, etc., may also be had. Surrounding fields are not suitable for land planes, the company reports, but lake and fields are good landing tracts in winter for planes equipped with skis. For parties arriving from the United States, a customs house is located in Grand 'Mere.

Fairchild Aviation Limited's Lac a la Tortue seaplane base near Grand 'Mere, Quebec. Byrd's polar Bellanca plane was recently ski-tested on this frozen lake, the edge of which is visible in the foreground.

Germany and Spain in Aero Agreement

Diplomatic permission must now be obtained before Spanish or German privately owned planes may pass over each other's territory, according to an aeronautical agreement recently signed by those countries. The ruling holds regardless of whether the airplanes make a landing, it is stated.

Airplanes, the agreement stipulates, must display plainly visible and distinctive marks of nationality and registration while in flight and must in addition bear the name and domicile of the owner. The certificates of registration, navigability, and other documents required in the home territory must be carried by the pilots.

Rulings of this type are increasing in number as the use of the airplane becomes more common. Because of the proximity of the various countries, it is necessary to make various international agreements regulating the use of the air.

Luft Hansa to Run Locals and Expresses

Local and express service is to be offered by the Luft Hansa in place of the single type now scheduled, according to recent statements by that company. Traffic this year will be speeded by the new arrangement, for the express planes will omit various intermediate stops on the network of airways. Paris or London, for example, will be reached from Berlin with only one halt instead of the usual three or four.

More night flying will also be offered on the new schedules. Service to Hanover is to begin shortly; and according to plans a night plane will soon fly between the German Capital and London, while another plane will leave Tempelhof

Field, Berlin, at 11 P.M. to arrive in Moscow the next afternoon at 3 P.M.

Tempelhof Field to Have Taxiing Track

To take care of increased spring and summer traffic, a number of improvements are being made at Tempelhof Field, Berlin, according to a recent announcement. Among the new features will be a concrete track, half of which will soon be completed, running around the entire landing field to facilitate movement of planes to hangars after they have landed.

Officials of the Luft Hansa, which operates the airport, state that an increase of 50 per cent. in traffic is expected this year. The International Air Traffic Exposition, to be held in Berlin October 8-28, will add to the activity.

An average of 36 planes a day took off or landed at the field last year. The number is expected to reach 60 this season.

Australian Company Reports on Service

Australian Aerial Services, Ltd., recently made public the following report covering operations of the company through February:

Total mileage as at Feb. 29, 1928	551,730
Total miles flown during February	18,223
Taxi plane mileage for February	5,578
Percentage of arrivals on scheduled time	62.5%
Percentage of arrivals not more than 30 min. late	70%
Schedule flights completed since Nov. 11, 1924	100%
Number of fatal accidents since beginning of service in 1924	Nil
Average speed including intermediate stops	66 m.p.h.

Italian Line Extends Service

The Italian Air Service, Inc., which maintains the air branch of the Cosulich Steamship Line's international travel services, has entered an agreement whereby planes will carry passengers from Trieste to Vienna and Budapest. Planes will take off at Zara, on the east coast of the Adriatic Sea, and make stops at Lussinpiccolo, Portorose, Trieste, Venice, Milan, and Turin. Seaplanes are used on this line, but land planes will be operated in the new Trieste-Vienna-Budapest service.

Portugal-Azores Service Planned

Fortnightly service between Lisbon and Funchal and three ports in the Azores—Ponta Delgada, Angra, and Horta—is to begin as soon as the weather becomes favorable, it has been reported. Junkers seaplanes will be used by the corporation forming the line. Two Germans who have become naturalized Portuguese citizens are the incorporators.

New Canadian Company Chartered

A Canadian federal charter has been granted to the Capital Aircraft Service, Ltd., according to a notice contained in the *Canada Gazette*. The firm, whose capital is listed at $50,000, will manufacture and repair airplanes and accessories. Headquarters of the company will be located in Ottawa.

Russia Fights Pests from Air

Russia is now fighting pests which periodically threaten the great grain raising plains of the land with chemicals sprayed from airplanes. The Soviet reports that during 1927 nearly 77,000 acres of agricultural lands were sprayed. This was a great increase over 1925 when only 2,700 acres were so treated.

Danish Army to Add 12 Fokkers

The Danish Army, it has been announced, will add 12 new Fokker pursuit planes to its force in the near future. Statement as to the type of power plant, other than the fact that the engines will develop 220 hp., has not been made.

power!

Better Piston Rings mean increased engine power—greater compression — less fuel consumption — more speed—and an added factor of safety. Regardless of what you pay, you'll find no better rings than

American
Hammered
Piston Rings

These are individually cast and tested from special mixture of close grained gray iron, assuring uniformity. Supplied in both compression and oilslot types. One piece—easily installed, absolutely concentric. The tension is hammered into the rings. They are accurately machined to fit piston groove and cylinder, making them leakless. Each ring in moisture proof envelope.

OX5 Standard size, 4" x .280, each	$0.25
OX5 .003 oversize in width, each	.25
OXX6 Standard size, 4¼" x .280, each	.30
OXX6 .003 oversize in width, each	.30
Hisso, A, E & I, 4.724 x .098 Compression ring, each	.40
Hisso, A, E & I, same size bevelled oil ring, each	.50
OX5 & OXX6 Oil Regulating	.50

Order direct from this ad — your order will be filled same day it is received.

OX5 Engine Manuals, 25c

Nicholas-Beazley Airplane Company, Inc.
220 No. English St., Marshall, Missouri

AIRPLANE STOCKS

A $1,000.00 investment in TRAVEL AIR AIRPLANE MFG COMPANY (of Wichita) one year ago is worth $7,000.00 on today's market.

To those who believe there is a future in the Airplane business and are willing to take a chance, we recommend the stock of the SWALLOW AIRPLANE COMPANY (of Wichita).

This is one of the oldest and best known airplane factories in the United States.

The stock pays no dividends at present and cannot be classed as anything but a speculation. If interested write us.

Price on application.

THOMAS INVESTMENT COMPANY
105 North Market St., Wichita, Kansas

PLANE OWNERS AND BUILDERS

WE are offering 50,000 yards of specification close weave airplane fabric at prices unheard of in the History of Aviation Supplies.

This cloth is 99 inches wide. And will cover any surface up to 8 feet without seams.

PRICES

1 - 40 yards	65 run. yd.
41 - 80 "	60 "
81 - 180 "	55 "
121 - 200 "	50 "
201 - 500 "	45 "

Money Order Or Cash With Order. All Prices F.O.B.

Immediate Deliveries, Sample Cuts if Desired.

Airplane Sales & Service Corporation
207 Market Street, Newark, N. J.
Phone Mitchell 0455.

AIRPORTS AND AIRWAYS

Springfield, Mass.

By Charles Hanson Gale

Capt. Eddie V. Rickenbacker flew here from Hartford recently to address a meeting of automobile executives on aviation. He came up in a Fairchild plane piloted by Kitty Barrows of the New England Aircraft Co. of Hartford, agent for the Fairchild cabin plane. The party landed at Randall Field, Agawam.

The famous war ace urged the immediate development of aviation facilities in this city which are largely lacking at the present time and his speech as reported in the newspapers made considerable impression on the city.

The enlarged Barnes Airport at Westfield will be dedicated May 25, 26, 27 by an air pageant to which a large number of well-known pilots are being invited. Preliminary preparations indicate that the affair will be one of the greatest aerial displays ever held in Western Massachusetts. The new brick and steel hangar which includes shops and offices will be dedicated at the same time. The field has been in existence for about six years and the rebuilding was started last fall.

Commander Charles E. Rosendahl of the Los Angeles addressed an enthusiastic meeting of the Exchange Club recently on some aspects of airship navigation, the destruction of the Shenandoah, and the recent flight to Panama.

Local Fields Busy

All the local flying fields are busy flying or getting ready to fly. Harry Herman opened the flying season at Dunn Field, Longmeadow, by flying down there in his American Eagle from Fisk Park where he assembled the plane. He assembled a Swallow there at the same time but has not taken it out yet. Fisk Park is preparing the field for flying purposes and it is expected to be ready soon.

Fred Boots, chief pilot for the Massachusetts Airways, has been flying out of Randall Field regularly. He recently tested an Eaglerock assembled by Lieut. Elzor Hall of the Springfield Ground School and delivered it to the Rollins Company of North Easton, the company's agent in Bristol County.

Ashbel H. Hoyt of Ware was recently elected a pioneer member of the Aerial League of America. His interest in aviation is said to date back to the early days.

A new wooden hangar has been built at Randall Field by Massachusetts Airways. The hangar is being used for the assembly of planes and will later be reserved as far as possible for visiting planes.

A group of men headed by Joseph Falk who have been attending the ground school of the Springfield Airport Corp. this winter are forming a flying club, it was recently announced. The purchase of a plane is included in their program.

Philadelphia, Penna.

A new administration building and machine shop will be constructed in the near future at the Philadelphia Airport for the 28th Division Air Service, Pennsylvania National Guard, according to a recent announcement by Maj. J. Sydney Owens, commander. Twenty thousand dollars has been appropriated toward initial construction work by the State Armory Board at Harrisburg, of which Gen. William G. Price, commander of the Pennsylvania National Guard, is chairman. The exact cost of the new buildings is uncertain at this time, but they are expected to involve an outlay of more than $100,000.

Archer Saki of Lakewood, N. J., president and operator of the Archer Flying Service of Lakehurst, was a visitor at the Philadelphia Airport recently, revealing during his stay here that he is selling his hangar, shop, and other equipment

Lighthouse of the Air

"S-D", the giant 10,000,000 candlepower airway beacon erected by the Standard Oil Co. of California on Mt. Diablo, near San Francisco Bay—sister beacon of "S-L" standing in the Merced Hills adjacent to Los Angeles. The 50 ft. letters, lighted with neon gas tubes, designate the Standard-Diablo and Standard-Los Angeles towers.

at Lakehurst and that he will start operations at a flying field site to be selected along one of the highways near Atlantic City. A 75 ft. by 100 ft. field hangar is to be erected on the new site, Mr. Saki said. He owns two Waco planes—a 9 and a 10.

A Whirlwind Travel Air—a special plane—is being stored at the Philadelphia Airport in one of the hangars of the Ludington Philadelphia Flying Service by Fred Stone, the musical comedy star. Stone purchased the plane during his recent trip through the West and flew here with a pilot. Last summer he took a flying course at the Philadelphia Airport and, with his daughter, Dorothy Stone, was a frequent and interested visitor at the airport. Stone recently flew the plane to Washington to fill an engagement and, still more recently, flew it to Atlantic City when his new show opened at the shore.

The United Flying Club's new Lincoln-Page (OX-5) was flown to the Philadelphia Airport recently from Lincoln, Neb.

Inspect New York-Atlanta Route

An inspection trip, for various purposes, over the route of the New York to Atlanta air mail service, was completed recently by Geoffrey S. Childs, general manager and vice president of Pitcairn Aviation, Inc.; James G. Ray, manager of operations; R. W. T. Ricker, a consultant on the development of air mail traffic, and Harold Holbrook, Director of Public Information. The party visited the Pitcairn operations at Candler Field, Atlanta, Ga.; Spartanburg, S. C.; Greensboro, N. C., and Richmond, Va.

Ground markers for the aid of pilots will be erected at Paoli, Malvern, and Berwyn, at the upper end of the Main Line of the Pennsylvania Railroad, by Dalton-Wanzel Post No. 646, American Legion of Paoli. The Post took action upon the request of F. Trubee Davison, Assistant Secretary of War for Aviation, who asked recently that the American Legion take an active part in the movement to erect 10,000 aviation markers throughout the country in 30 days. A committee representing the Post will confer soon with members of the State Aeronautics Commission here.

McKeesport, Penna.

Success of the aeronautical exhibit held recently here under the auspices of the local N.A.A. chapter have led the group to plan for such an exposition annually.

About twenty exhibitors of parts and various materials used in the manufacture of airplanes were present at the recent show. Aerial photography and model airplane displays were also included. The three boys who won in the model airplane contests were given trips to Cleveland, O., in one of the Ryan monoplanes used on the mail line. All their expenses were paid.

St. Louis, Mo.

By M. L. Alexander

Col. Charles A. Lindbergh's famous monoplane the "Spirit of St. Louis" now on public exhibition at Lambert-St. Louis Field, is to be turned over to the Smithsonian Institution at Washington, within two or three weeks, it is understood, so St. Louisans have only a short time left in which to view the historic plane on its home field.

Before Lindbergh turns the plane over to the Smithsonian, it is understood that he will take each of the financial backers of his trans-Atlantic flight for a hop around the field so that it may be said that the backers were the last to be carried in the plane. That, it is said, is the method Colonel Lindbergh has taken of signalizing his gratitude to this group of St. Louisans.

Parks Airport, the new flying field just south of East St. Louis is to have its first flying provided weather is favorable.

Grass

for...

Airports

and Landing Fields

Our 30 years of experience in supplying and advising with leading Golf, Country and Polo Clubs and our intensive study of the production and maintenance of the best turf for various purposes, places us in a position to give authentic and dependable information in regard to suitable turf for Airports and Landing Fields. We are glad to offer this knowledge to the aircraft industry.

Airport Formula

We offer a formula, adapting it to particular soil and climatic conditions, consisting of a special combination of grass seeds that will produce the proper turf for Airports and Landing Fields.

Landing Field Construction Equipment Fertilizers

Stumpp & Walter Co

30-32 Barclay St., New York City

HAVE seats for sale in Stinson Monoplane entered in 1928 National Air Tour. An eight thousand mile trip taking one month's time. Price $1000.00 per seat. Paul Braniff, Braniff Building, Okla. City, Okla.

PAXTON

Airplane Spruce

Airplane spruce in large assortments. Carload or local shipments. Kiln dried and graded in accordance with U. S. Navy specifications.

Frank Paxton Lumber Company

Packers Station

Kansas City, Kansas

SPECIALIZING IN ALL KINDS OF AIRPLANE LUMBER

SPECIAL ENROLLMENT OFFER

at the World's Largest Civilian

FLYING SCHOOL

This FREE BOOK tells you of the remarkable opportunities in aviation—shows what others have done through our training. We want to send you a copy—write us for it at once.

New type planes—latest motors and equipment—high salaried instructors—all these things tend to increase the cost of training and make it necessary for us to increase our tuition to $450.00 for the combined ground and flying courses. But for the benefit of many who have planned to take our course, but put it off, we make this SPECIAL OFFER FOR A LIMITED TIME—the ground course and flying course together for only $290.00!

To get this saving you must ACT RIGHT NOW. Your greatest opportunity is in Aviation — the world's greatest profession. Trained men are needed badly—but ONLY TRAINED MEN. Here you learn by actually flying, and by working on planes and motors, under expert guidance. WRITE US TODAY.

MARSHALL FLYING SCHOOL, INC.

Affiliated with Nicholas-Beazley Airplane Co., Inc.

604 NORTH ENGLISH ST., MARSHALL, MISSOURI.

ENGINEERING - DESIGN

TECHNICAL PRACTICAL

Complete designs and specifications. Assembly and detail working drawings. Stress analysis of parts or complete airplanes. Wind tunnel model construction a specialty. Wind tunnel tests. Performance analysis. Assistance in developing, patenting, and financing meritorious inventions.

H. R. VAN DEVENTER, Inc.

A. A. Kucher, Aeronautical Engineer

342 Madison Avenue, New York City

Keeping Abreast

of aeronautical activities is possible only by reading

AVIATION

each week. Yearly subscription rates: United States $4; Canada $5; Foreign $6.

AVIATION

250 W 57TH ST. NEW YORK CITY

O. L. Parks, president of Parks Airlines, which operates the field, announced that he would have at least one Travel Air at the field and possibly two.

The formal opening of the field was tentatively set for April 28. Colonel Lindbergh has accepted an invitation to be present, Parks says, and the date will be reset only in the event Lindbergh cannot be present at the time fixed. Dirigibles from Scott Field and pursuit planes from Selfridge Field are also scheduled to be on hand to entertain visitors.

Another new field, within reach of St. Louis, is being prepared at St. Albans, Mo., on the Missouri River in Franklin County, by Oscar Johnson who recently bought a Whirlwind Travel Air and engaged "Boots" Dempsey to fly it for him. The field, a 60 acre tract, is on the bank of the Missouri and is part of the country estate of Johnson's mother.

O. E. Scott a Veteran Manager

O. E. Scott, manager of Lambert-St. Louis Field since it was converted from a cow pasture to an airdrome, has been retained by the city to fill the same job under municipal control. Scott is pilot for Harold M. Bixby, chairman of the board of the Chamber of Commerce, and owner of the first Travel Air ever manufactured. He is shortly to turn in his old plane, an OX-5 job, for a Whirlwind Travel Air.

Frank T. Dunn, pilot for Phil Ball, owner of the Browns, flew Ball's Ryan Brougham to Tulsa with Walter Fritsch, vice president of the club as his passenger. Fritsch looked in on the Browns, who were in Tulsa at the time.

Dunn plowed through heavy weather for the southward trip, which took 6 hr. 45 min. against a heavy headwind. Coming back with a tailwind Dunn flew from Tulsa to St. Louis in 3 hr. 10 min.

Tex LaGrobe visited the field recently with a Siemens-Halske Waco. It is the first time a plane with the German engine, now made in America, had visited the field and LaGrobe allowed several of the field pilots to fly it.

Kansas City, Mo.

By H. H. James

The "Airplane Bishop" is to visit Kansas City in May. He is Bishop John L. Neulsen of the Methodist Episcopal Church, and is now located at Zurich, Switzerland. He is coming here to attend the general conference of his church which opens May 1.

Bishop Nuelsen has become known throughout Europe as "the Airplane Bishop" because of his frequent use of planes in his work. By using a plane he frequently preaches in three countries in a day. He will hold a morning service in Zurich, take a plane and fly to Moscow, Russia, for a night service, stopping at some point in Germany for an afternoon service.

The Bennett Flying School of Kansas City has opened night classes for persons employed in the daytime and who desire to learn to fly. The night classes provide thorough training in the ground work of aviation and includes instructions in engine work, fuselage welding, covering and building wings, rebuilding planes, etc.

Classes Six Nights a Week

The night classes are conducted at 217 W. 12th. St., where the class room has been equipped with OX-5 engines and Swallow and Eaglerock fuselages. The location is central and easily reached from all parts of the city. The classes are conducted six nights each week, from 7 to 10 o'clock.

When the students are ready for actual flying they are then transferred to the school's flying ground at Richard's Field. When the course is completed the government examination for a commercial pilot's license can be taken at the

field without cost, a United States officer giving the examination.

To create a wider interest in aviation, the N'-Sun Lines, operating buses and airplanes out of Kansas City, has established a free bus service from the downtown sections on Sunday to the company's flying field at Richard's Field.

Washington, D. C.

W. R. Gregg, chief of the aerological section of the Weather Bureau of the United States Department of Agriculture, has recomended the construction of a new upper-air station at Greensboro, N. C., to serve as a meteorological station along the New York to Atlanta air mail route.

The Bureau's well-equipped meteorological stations at Hadley Field, northern terminus of the route, and at Washington, will be used in the new service.

These announcements came as a result of arrangements that have been made between the Weather Bureau and Pitcairn Aviation, Inc., of Philadelphia, for a complete weather reporting and forecasting service in connection with the new air mail route which will be inaugurated May 1.

The Bureau has arranged with the Pitcairn company to appoint field managers of the company as airway observers. The observers do not make forecasts of the weather, but simply observe conditions as they are and give reports to adjoining stops on the line just before the pilot takes off, so that he may be informed of conditions ahead.

This appointment carries no compensation but enables these men, through their official status, to call for reports from airway stations and exchange them with adjacent airports, and to certify the telephone and telegraph accounts as correct. The report covers temperature, barometer readings, visibility, ceiling, and storms.

The airway observer stations will be located at each stop along the route and at many emergency fields between the main stations, which are operated by experienced meteorologists.

This arrangement is temporary, for it is expected that during the summer the trained Weather Bureau personnel will take over the work at Washington, Greensboro, and Atlanta airports.

Chicago, Ill.

By H. H. Slawson

An air tour of Illinois with some 20 or more planes in the parade, is planned for June by the aeronautical committee of the Illinois Chamber of Commerce. Its aim is to encourage airport construction and stimulate interest in aviation.

A substantial increase is noted in the quantity of air mail carried over the routes leading to and from Chicago during March. On the Chicago-New York and the Chicago-Kansas City-Dallas lines, the month's total was 59,864 lb. as against 48,187 for February.

Bids for the air mail contract on the Chicago-Atlanta air mail line will be opened in Chicago April 30, it is announced.

Express service by airplane between Chicago, Springfield, and Peoria, Ill., and St. Louis, Mo., is now being supplied by the Robertson Aircraft Co. cooperating with the American Express.

A remarkable aeronautical demonstration was supplied recently in the flight of 100 Milwaukee business men to Chicago to attend a meeting of the Chicago Association of Sales Managers. Some 30 planes brought the Badger City salesmen down for supper. The party included Gov. Zimmerman of Wisconsin and Bert Acosta.

Illinois has 58 good air fields, according to the figures issued by the aeronautical branch of the Department of Commerce.

An All-Chicago model airplane tournament is being promoted by the *Chicago Tribune*. Indications point to a record entry. Competition is divided into two classes. Boys

William. E. Arthur & Co., Inc.

Aeronautical Engineers & Builders of Airports

Consulting
Designing
Engineering
Construction

Another Airport by Arthur—

Bridgeport, Connecticut, now under construction with both land and seaplane facilities.

292 Madison Avenue **New York City**

Phone: Cal. 7389 ***Cable: "WEART-NY"***

NITRATE DOPE

NEW PRODUCTION **IMMEDIATE SHIPMENT**

Contractors to U. S. Army and Navy

VAN SCHAACK BROS. CHEMICAL WORKS

3358 AVONDALE AVE. **CHICAGO, ILL.**

OX5 Cylinders

Have your worn cylinders reground and oversize pistons furnished.

Write for prices.

Engine and Machine Part Manufacturing a Specialty.

Edward A. Whaley & Co.
Norfolk, Va.

PERRY-AUSTEN

Acetate Nitrate DOPES *Clear Pigmented*

Used by

ATLANTIC AIRCRAFT
BUHL AIRCRAFT CO.
CHANCE VOUGHT CORP.
CURTISS AEROPLANE MOTOR CORP.
CONSOLIDATED AIRCRAFT
DOUGLASS COMPANY
GLENN L. MARTIN CO.
HUFF DALAND DUSTERS
JOHNSON AIRCRAFT
LOENING AERONAUTICAL
PITCAIRN AVIATION
U. S. ARMY
U. S. NAVY
U. S. POST OFFICE
U. S. DEPT. OF AGRICULTURE
AIR TRANSPORT LINES
FOREIGN GOVERNMENTS
AND MANY OTHERS

Perry-Austen Clear Acetate Dope,

The Lasting Undercoat

THE BEST FINISH
UNDERCOATS
Perry-Austen Clear Acetate

OVERCOATS
Perry-Austen Pigmented Dopes

PERRY-AUSTEN MFG. CO.
STATEN ISLAND, N. Y.

Contractors to United States Government

AIRCRAFT DEVICES CORPORATION
347 MADISON AVENUE, NEW YORK, N. Y.

ADCO

ADCO Fuel Pumps
ADCO Spark Plug Testers

Accessories Development Undertaken

CONTRACTORS TO THE U. S. GOVERNMENT

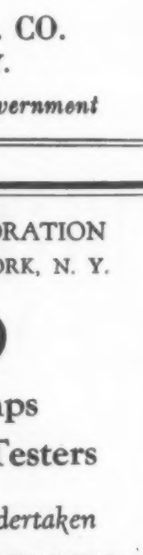
Write for our new catalog No. AV.2.

Helmets and
Smart Wearing Apparel
for use in open ships Summer and Winter

Special clothing for
CABIN SHIP AND GROUND WEAR

IHLING BROS. EVERARD CO.

Kalamazoo Uniform Co.
KALAMAZOO, MICH.



under 16 years of age are eligible for Class B events. Those between 16 and 21 enter Class A, the senior division. There will be an outdoor commercial duration competition on May 19 at Soldier Field. Then on May 26 an outdoor duration contest for all models will be staged in Washington Park. Lastly, on May 27, the indoor events will be held in a national guard armory.

Spokane, Wash.

By E. Harve Partridge

One new Douglas O2 plane, and possibly two, will be received soon by the national guard unit, Lieut. C. V. Haynes, regular Army instructor, has been informed. The unit now has Lieutenant Haynes' DH, two Douglas O2's, and two Consolidated PT's.

Request from the Virgin Islands as to best methods of acquiring an airport and developing it has been received by the Spokane Chamber of Commerce. The Chamber sent data.

Actual bombing practice and machine gun work, the first the 41st Squadron has done, will be undertaken soon, Maj. John T. Fancher has announced. Heretofore practice work has been limited to individual and formation flying and ground work.

The Buhl Whirlwind plane in which Pilot Niek B. Mamer of Spokane won third place in the Class A New York-Spokane air derby in 1927 has been sold by the Mamer Flying Service to Samuel J. Wilson, president of the Northwest Mines Investment Co. It has been christened the "Golconda". Ownership of many mines in Washington, British Columbia, and Mexico made it necessary for some quick means of travel from property to property, and Mr. Wilson decided the airplane furnished the only means possible of getting first hand and accurate data from the mines.

Pilot Mamer has made the first trips with Mr. Wilson as passenger but the mine head will employ some Spokane flier for full time duty. A trip to Mexico is contemplated in the near future.

Atlantic City, N. J.

Bader Field, Atlantic City's Municipal Airport, is being used as the Atlantic City terminus of the new taxi airplane service between Atlantic City and Camden that is being operated by the Crescent Air Service, Inc.

A temporary canvas hangar has been erected at the airport pending the building of a steel hangar capable of accommodating five or six planes. "The hangars," Reuben A Fowler, secretary-treasurer of the Crescent company, explained, "will be used until Atlantic City moves its temporary convention hall to Bader Field and uses it as a hangar. The canvas hangar can house two planes."

Mr. Fowler inaugurated the service recently when he flew to the shore in a three place Challenger plane. The plane was piloted by George C. Hand, the company's chief pilot, and it took off from the Crescent Airport. A regular schedule and rates are to be announced within a few weeks.

Four three place Challenger planes will be operated on the shore route during the summer months. Five of these were recently delivered at the factory at Hagerstown, Md. All were flown to Camden by Chief Pilot Hand. Until a regular schedule is announced, the company will make flights between Camden and Atlantic City at the convenience of patrons.

The company has established headquarters at Bader Field and Mr. Fowler will be in charge of operations at this terminus until organization plans at Atlantic City are completed, Frederick A. Riedel, president of the company, will continue in charge of operations at the Camden terminus at the Crescent Airport.

Among the recent visitors who flew to Bader Field were Mayor Anthony M. Ruffu, Jr., Harry H. Krechmer, president of the Atlantic City Aero Club, and Mr. and Mrs. Lowell

Harding, all of whom came here from Philadelphia in a Fairchild cabin monoplane owned by the Potomac Air Service, Inc., of Washington, D. C., and Gettysburg, Pa., and flown by Mr. Harding. The plane also visited the Crescent Airport in Camden during its flights in this section of the state.

New Brunswick, N. J.

The Aero Club of New Brunswick recently heard J. D. Peace of the Pioneer Instrument Co. of Brooklyn, N. Y., speak on "The Earth Inductor Compass and Blind Flying". The talk was illustrated with lantern slides of various instruments used in modern planes.

Leslie Cramer and John Fuchs, both of the local club, recently had the pleasure of a flight to Cleveland over the air mail route. They were favorably impressed by the Cleveland Municipal Field. Since the trip, both men have realized more fully the value of air mail lines; and John M. Miller of the club now comes forward with the suggestion that air mail contractors should carry more of the country's business men—a top notch advertising idea.

John G. Whytlaw, Jr., of New York City was the first to solo this year at the New Brunswick Airport.

Detroit, Mich.

By John T. Nevill

Eddie Stinson and George Haldeman, holders of the world's airplane endurance record, were honored guests recently at a dinner in the Presbyterian Church dining room at Northville, Mich., where the Stinson airplane factory is located.

The affair was sponsored by the Northville Exchange Club, aided by the Rotary club and the business men of the village. Among the guests present were Mrs. Stinson, who watched her husband's record flight in Florida, and engineers and mechanics of the factory. William Mara of the Stinson Aircraft Corp. was toastmaster.

Mrs. Evangeline L. L. Lindbergh, accompanied by Miss Maud Dawson, a fellow teacher at the Cass Technical High School, recently flew to Toronto, Ont., to attend the annual convention of the Ontario Educational Association. Mrs. Lindbergh was made a life member of the organization.

The flight was made in a five passenger Buhl cabin plane piloted by Louis G. Meister, sales manager of the Buhl Aircraft Co. of Marysville, Mich.

George Shore, piloting a tri-engined Ford airplane, broke the record for the Detroit-Buffalo Ford air route recently when he flew from this city to Buffalo in 1 hr. 35 min.

Leaving Detroit at 8:45 A.M., Shore landed his plane, carrying 1,300 lb. of freight, on the Buffalo field at 10:20 A.M. Officials at Ford Airport said that no attempt was made to better the record.

John J. Peace, field engineer of the Pioneer Instrument Co., recently addressed the Detroit Flying Club at the Book-Cadillac on the operation of navigation instruments. A feature of the program was a slow motion picture showing the operation of a Handley Page wing slot, the flow of air over a wing curve, and the travel of a bullet fired from a high powered rifle. Peace said the film required 20,000 exposures a second.

Orlando, Fla.

By R. T. Bly

Both east-west and north-south runways of the new municipal airport here have been cleared and graded. Construction of another through street to the center of the city is also being rushed at this time to provide better transportation to the field.

Two students soloed recently at Buck Field under the direction of the Orlando Airlines School. One of these students was L. W. Stacy, student mechanic who it is expected will

Aircraft Manufacturers & Dealers

WE own and offer for sale for immediate delivery a large stock of 150 H.P. and 300 H.P. Wright Hispano-Suiza motors and parts. Don't neglect the opportunity. Write or wire for prices. State quantity desired.

Southland Jobbing House
Norfolk, Va.

HARTZELL
RELIABLE!
HARTZELL PROPELLERS ARE RELIABLE
20 Years Experience Behind Our Service
HARTZELL PROPELLER CO. PIQUA, O.

Seamless Steel Tubing
ROUND, STREAMLINE, ETC.
Furnished to Specifications in
STRAIGHT CARBON
NICKEL STEEL
CHROME MOLYBDENUM
Specialists in Aircraft Tubing—Manufacturers for 25 Years.
SUMMERILL TUBING COMPANY
BRIDGEPORT, MONTG. CO. (Philadelphia District) PA.

At Your Service

AERO SUPPLY MFG. CO., INC.

Manufacturers and Distributors of

Airplane Accessories and Supplies

Call on us for anything
We will help you

COLLEGE POINT L. I., N. Y.

TITANINE
Registered Trade Mark

A Complete Range of
AIRPLANE FINISHING MATERIALS

Dope-proof paint, black, white, aluminun or grey;
Clear nitrate and acetate dopes;
Ti-two colored one-material dope;
Pigmented nitrate dopes;
Flexible wing lacquer;
Wood and metal lacquer (for inside and outside finish).

TITANINE, Inc.
Union, Union County, New Jersey
Contractors to the United States Government

FOR THE SMALL PLANE

THE NEW SERIES
ANZANI
ENGINE
RADIAL . AIR COOLED

BROWNBACK MOTOR LABORATORIES, Inc. Sole Distributors
Graybar Building — New York

remain in charge of the field, machine shop, hangar, etc. when E. C. Nilson, president of the Orlando company, takes over the supervision of the new municipal airport.

An airport beacon with visibility of 20 mi. has been installed on top of the 10 story State Bank Bldg. in the city's center. It is automatically turned on at dusk and off at dawn. A constant white beam is thrown from the beacon which rotates once each minute.

The other light in this vicinity is a nine second light at Benson Springs. Airport beacons are also in operation at Jacksonville, Tampa, Orlando, Lakeland, and Miami.

Portland, Ore.

By John W. Anderson

Verne C. Gorst, former president of the Pacific Air Transport Co. and now operator of a flying school in Seattle, and Walter T. Varney, president of the Varney Air Lines, air mail contractor on the Pasco, Wash.-Salt Lake City line, are sponsoring further experiments with monster parachutes to lower disabled planes. Gorst has at his Portland home the parachute used by R. Carl Oelze, the pilot in a 2500 ft. drop in California. Experimental landings will probably be made here when the device is considered perfected.

W. O. Snyder, Washington, D. C., of the airport division, Department of Commerce, paid an unofficial visit to the Port of Portland Airport recently. He discussed methods of financing and other airport problems with J. H. Polhemus, general manager of the port, and C. O. Lovaas, superintendent of the airport.

Salt Lake City, Utah

By Robert Blackstone

President Frank of the National Parks Airways, Inc., the new air mail line from Salt Lake City to Great Falls, Mont., has announced that survey work for intermediate fields and improvements on the airports of the regular stops is progressing rapidly and cooperation is evidenced on all sides.

This new airline will use four Super-Universal Fokkers, powered with 420 hp. Wasp engines. These monoplanes are six passenger cabin planes which will not require special flying clothes for air travellers.

Mr. Frank said that the company has promised to deliver the first Fokker May 15, and one every two weeks until they have the fleet. Service is scheduled to begin June 1.

Ardmore, Okla.

The Oakley Airport here is making many plans for future development and for future work in making Ardmore the air-minded center of Southern Oklahoma. A new Travel Air three passenger biplane has been purchased to use in work at the field. This is the first step in the plans for expansion.

Modern equipment will soon be had at the local airport. The hangar is to be developed into a first class service and repair shop for visiting planes. Southern Oklahoma has long been in need of such a place as this for there are no large repair shops there. Ardmore offers an ideal location for such a shop.

Ames, Ia.

The Gerbracht Aeronautic Corp. has leased a 40 acre field two miles south of Ames on the Jefferson Highway, that has been leveled and is being sodded with blue grass to be in good condition for the fliers. This site is marked with the customary circle, it has three unobstructed runways, there is the usual wind cone on the hangar, and a new Butler T-shaped individual hangar is being erected for the storage of some local plane.

The Gerbracht Aeronautic Corp. is the Travel Air distributor for Iowa and is progressing with a good business in passenger hopping, cross-country flights, and student instruc-

ting. One of the recently sold Travel Airs was an OX-5 plane delivered to Lee Merritt, a student at the Iowa State College in this city, who recently soloed. R. W. Sommers is receiving flying instructions at present from Wilford Gerbracht and will receive a new Travel Air soon, which will also be used by the Cooper Flying School of Des Moines in air taxi service and the instructing of students.

Herman Banning, the local colored flier, is having his Humming Bird rebuilt at the White Aircraft Co. at Des Moines and will have it ready for service within the near future.

Norton, formerly of Boone, Ia., but at present conducting a flying school at Independence, Kan., stopped over at the field operated by the Gerbracht Aeronautic Corp. in his Swallow to pay his old friends a visit.

Miles City, Mont.

By J. V. Packard

The new Miles City Municipal Airport will be 5280 ft. by 7920 ft. An additional 80 acres to the west of the present field is being purchased, and work on improvements will begin immediately. The airport is located on perfectly flat table land with no obstructions of any kind near the field.

Modern hangars, complete facilities for the servicing of planes, and other improvements will be made. Many letters of commendation have been received by pilots who used the field during the New York-Spokane race of last year in regard to the airport, which is one of the finest natural landing fields in the country.

Jay Gehan landed at the airport recently en route to Havre, Mont., from Sioux City, Ia., with a group of four stockmen bound for the convention of the Montana Stock Growers Association. He is flying a Ryan Brougham for the Stransky Airlines at Pukwana, S. D.

Kellogg, Idaho

By Ralph Lafferty

In response to the invitation of the Shoshone Flying Club, about one hundred men recently appeared on the site for the new aviation field here and cleared the grounds of stumps and debris. Four tractors, nine trucks, and two graders were furnished by the county and city of Kellogg. A field was cleared 2000 ft. in length and 400 ft. wide. After a little more work the airport will be one of the best in the state and about the only one between Missoula, Mont., and Spokane, Wash. The field will be used frequently by fliers from Montana, Idaho, and Washington.

After the field is in shape the Kellogg Flying Club with Kermit Paul as their aviator, will start training students to fly. They have purchased a new Waco 10 for the purpose.

Cincinnati, O.

Each Tuesday night over the radio, two members of the Embry-Riddle Co. here conduct an aviation forum, answering the questions that are mailed to the studio and field. Usually, John Paul Riddle and Charles E. Planck conduct this "aviation conversation." The questions sent in concern flying schools principally, according to Riddle, but technical questions as well are asked. Many of these are answered by letter.

The interest of Powel W. Crosley, head of the radio corporation, in aviation, enables the operating company to give these programs. It is believed that they are rapidly piling up a wide interest in aviation in the neighborhood served by WLW.

Electra, Tex.

By T. J. Stansel

C. L. Still of this city recently returned from the factory with a new Waco 10 plane and is now demonstrating it here. Still states that he has lined up a number of prospective Waco purchasers.

CURTISS-REED PROPELLERS

National Air Transport, operating the Air Mail and Express lines from New York to Chicago and Chicago to Dallas, write us:

"Of the 11 Curtiss-Reed propellers which we now have, one has seen 1,000 hours' service, one over 900 hours, one over 800 hours, two over 700 hours, and the remainder between 300 and 500 hours.

"We feel sure that all of them are good for 1500 hours unless some difficulty should develop which we do not anticipate now."

Two Types now available

Type R.—A solid forging of high efficiency and strength. Particularly desirable for motors of 200 H. P. or more.

Type D.—A flat, twisted type, for lower-powered motors. The most inexpensive metal propeller on the market today, despite its efficiency and long life.

Write for Prices

The Curtiss Aeroplane & Motor Co., Inc.

Offices: Garden City, N. Y.
Factories: Garden City & Buffalo, N. Y.

Curtiss

Type F, Star Pathfinder Compass

The newest type of Aircraft Compass

(flush mounting)

Type F, Star Pathfinder Compass has a built-in compensating unit, eliminating use of troublesome loose magnets. Mounts flush with instrument board surface and compensating unit is easily accessible by means of a removable cover plate. Spherical magnifying cover lens gives great visibility.

CONSOLIDATED Instrument Company of America, Inc.
41 East 42nd Street, New York

Altimeters, tachometers, oil pressure gauges, gasoline gauges, thermometers, air speed indicators, compasses, navigation lights, landing lights, dash lights, etc.

Teitzel Made

Foot and Leg Fitting

BOOTS

Carried in stock or made to measure. Also Sam Browne belts, puttees and trees. Send for prices and catalog.

TEITZLER-JONES-DEHNER BOOT CO., Inc.

Wichita, Kansas

What Do You Know About Airplanes?

A FEW years ago men had to learn about aircraft from personal, costly experience. They had no one to guide them—no one to point out mistakes when they were made—and therefore years were spent learning what takes months now.

Thorough--Practical Training

Today the American School of Aviation offers you these long years of experience and knowledge, which cost millions to acquire, in their new and fascinating Home Study Course in Practical Aeronautics which has been highly endorsed by prominent aviation authorities.

Write Today

No matter whether you have worked with airplanes all your life or are just beginning in the industry you owe it to yourself to send for a complete and detailed outline of this training and our new and interesting free book, "Opportunities in the Airplane Industry."

American School of Aviation
Dept. 8284
3601 Michigan Ave., CHICAGO, ILL.

SEAMLESS
STEEL TUBING
All Aircraft Grades

WAREHOUSE STOCKS for immediate shipment in any quantity.

MILL shipments for substantial production requirements.

SERVICE STEEL COMPANY
1435 Franklin St. DETROIT
43 John St. CINCINNATI

TO MAKE AMERICA FIRST IN THE AIR

IS THE PURPOSE OF THE

National Aeronautic Association

In this effort it merits and invites YOUR cooperation and support

Regular Membership $5.00 per Year

NATIONAL HEADQUARTERS
The Barr Building, 910 17th St., N.W.
Washington, D. C.

UNITED STATES AIR FORCES

Number of Air Corps Planes Low

Recent inventory of Air Corps equipment revealed that a total of only 889 serviceable planes were on hand—the lowest mark reached by the Air Corps since military planes were placed in mass production during the World War. Air Corps officials feel certain, however, that this number will remain as the low mark, since a steady influx of new planes is beginning.

With three new planes in, the total has risen to 902. The inventory shows these as follows: nine attack, 80 bombardment, 410 observation (including 26 equipped for photographic purposes), 171 pursuit, 194 training, 26 cargo, and 12 miscellaneous types. With the exception of 251 observation planes of the DH type, the 12 miscellaneous, and 60 bombardment planes, the remainder are of comparatively recent design and construction. The DH's and the miscellaneous types are the only planes on hand which were constructed during the war. All but 17 of the DH's have been remodeled and considerably strengthened by the substitution of metal fuselages for the conventional wooden ones.

As the result of contracts for new equipment, a total of 386 new planes of various types are due to be received. Incidently, it should be stated that 54 experimental planes now on hand are not included in the total of 902.

Experts Designing New Navy Airship

A committee composed of five of the world's foremost experts on the planning and building of lighter-than-air craft will shortly submit to the Navy plans for the building of an aircraft two and one-half times larger than the dirigible "Los Angeles." A bid for the construction of this ship will be submitted by the American Brown Boveri Electric Co. of New York, it is stated.

The committee for the New York electrical firm is composed of Prof. William Hovgaard, in charge of aeronautics at Massachusetts Institute of Technology, chairman; Capt. Anton Heinen, formerly with the Zeppelin company in Germany, Prof. Herbert C. Sadler of the naval architectural and aeronautical department of the University of Michigan, W. Watters Pagon of Baltimore, and Ernest R. Riggs, chief engineer of the New York Ship Building Co.

The new ship, according to preliminary plans, will be a craft of 6,500,000 cu. ft. It will have features of both German and English airships but will be fully American in construction.

Prepare for Love Field Summer Training

Negotiations for the 1928 summer training camp of the 8th Corps Area of the U. S. Air Reserve at Love Field, Dallas, Tex., have been completed by Lieut. Harry Weddington, officer in charge of the 366th Observation Squadron and Lieut. Harry B. Barnhart, adjutant of the squadron. The summer training camp will be open continuously during July and August at Love Field.

The camp will be attended by reserve officers from Texas, Oklahoma, New Mexico, and Colorado, with 14 days of training given to classes of 35 men. Training will be under the supervision of Lieutenant Weddington, the equipment to be used being seven training planes and one Douglas O-2 service plane.

Rickenbacker Bill Goes to Committee

A bill recently introduced in the House of Representatives asking award of the Congressional Medal of Honor for Capt. Eddie Rickenbacker, leading American war ace, has been referred to the Committee on Military Affairs.

WHERE TO FLY

California

Learn Aviation at the University of the Air

The First Adequately Equipped Aviation School in America

Twenty per cent of the aviation activities of the United States are located in Southern California. Our students are in touch with this immense field.

Day School-Night School-Home Study

Send for new catalogue and complete information.

Warren School *of* Aeronautics

120-26 W. Slauson Ave., Los Angeles, Cal.

California

The Western College of Aeronautics
Announces

Mr. Wm. J. Waterhouse,

Internationally famous aeronautical engineer. Dean of the W. C. of A. Faculty. The Western College of Aeronautics is not merely an aviation school but is a true University of the Air, one of the most adequately equipped aviation training institutions in the entire West.

Our courses on every phase of ground and air schooling are not excelled.

Investigate this statement and be convinced.

Full information mailed on request.

Western College of Aeronautics
154 West Slauson Avenue
LOS ANGELES, CALIFORNIA

California

PACIFIC TECHNICAL UNIVERSITY

SAN DIEGO CALIFORNIA

"Air Capital of the West"

Offers home study courses in Aeronautical Engineering and Practical Aviation.

Residence Courses in well equipped shops, with class room instruction.

Affiliated with Ryan Flying School, where our students can actually learn the art of flying with new airplanes equipped with the famous Ryan-Siemens Engines.

WRITE FOR CATALOG

California

LEARN TO FLY IN
San Diego—Air Capital of the West

RYAN *Flying* SCHOOL

Perfect Year Round Flying Climate · Modern Equipment · Complete, Thorough Course Specially Trained Instructors · Small Classes Individual Instruction · Close to Largest Army, Navy and Marine Base in West · Write for Catalog.

RYAN

RYAN FLYING SCHOOL
San Diego, California

Connecticut

INTERSTATE AIRWAYS, INC.

Expert flying instruction. School endorsed by the highest State and Federal authorities. Largest commercial hangar in New England.

TRAVEL AIR DISTRIBUTORS

Address Brainard Field
Box 31—Station A. Hartford, Conn.

Connecticut

NEW ENGLAND AIRCRAFT CO., INC.
DISTRIBUTORS FOR

WACO AIRPLANES

The FAIRCHILD CABIN MONOPLANE

Flying instruction year round on new Waco 10s. Commercial flying, Advertising, Photography, Aerial exhibitions, Parachute drops, supplies and service. Operating largest school of commercial flying instruction in New England. We operate from Brainard Field, grade A certified airport.

Executive Offices
805 MAIN ST., HARTFORD, CONN.
Phone Office 2-2553 Phone Field 3-142
WORCESTER BRANCH FLYING SERVICE
North Grafton, Mass. Phone Park 6845.

Georgia

PITCAIRN AVIATION of GEORGIA, Inc.

10-HOUR FLYING COURSE, conducted at Candler Field, Atlanta, Ga., a 4-way flying field. All-year-round school employing modern flying equipment including Pitcairn Orowings. No liability bond required.

Write for details.

Land Title Building
PHILADELPHIA

Illinois

CHICAGO AERO SALES
FLYING FIELD
Sales—"WACO AIRPLANES"—Service
Student training in *new Waco* 10 airplanes
Rates and full particulars on application
Office—8027 Ogden Ave., Lyons, Ill.
Phone, Lyons 7121.
Flying Field—Joliet Rd. and East Ave., La Grange, Ill.

Illinois

Only 50 miles west of Chicago
EAGLE AIRPORT SCHOOL OF AVIATION
Herman J. Neubauer, M.D.
HINCKLEY, ILLINOIS

Learn to Fly at our up-to-date school at very reasonable prices. Complete ground and air course. Come any time. Ideal accommodations for students. Expert instructors. Write for information.

Illinois

MIDWEST AIRWAYS CORPORATION
Monmouth, Illinois

Waco airplane distributors in Illinois and Iowa. Complete flying and ground course, using new planes.

Illinois

Aviation Service & Transport, Inc.

Will train a few additional men intensively or spare time or home study for good pay positions in flying or ground mechanics. Best central shop and field location. Only U. S. licensed latest planes, pilots and instructors. Write Dept. A. W., Aviation Service & Transport, Inc., 205 N. Wabash Ave., Chicago.

Illinois

Quincy Aircraft Company
QUINCY, ILLINOIS

Complete flying and ground course. Licensed Waco planes. Transport licensed instructors. Large field. Write for information.

Indiana

Learn to fly at the Cross Roads of the Nation with instructors who have had 12 years experience teaching men to fly.

HOOSIER AIRPORT
Indianapolis, Indiana

Distributors for TRAVEL AIR Planes in Illinois, Indiana, Kentucky, West Virginia.

Flying Before the War and Still at It

Indiana

We Teach You — *RIGHT*.

— THREE —
Complete Practical Courses

INVESTIGATE US—WE WANT YOU TO

We have the finest equipt school shop in the country—Swallows for instructions.

We qualify you for Dept. of Com. licenses.

Mechanics Course 50.00
Private Pilots Course 250.00
Limited Commercial 50 Hr. Course 650.00

No Bond for Solo—We're Not Afraid of Our Graduates. Send for Descriptive Literature and Free Booklet.

ATKINSON AVIATION CO.
"SCHOOL OF AERONAUTICS"
406 WASH. ST. GARY, IND.
REFERENCES PLENTY

Iowa

LEARN TO FLY ON NEW 1928 WACO PLANES

COMPLETE FLYING AND GROUND COURSE $125.00. Send for Catalog.

Distributors for Waco Airplanes

DAVENPORT AIRPORT INC.
DAVENPORT, IOWA

Kansas

Learn to Fly the Great Western Way. We teach Navigation, Meteorology, Airplane Assembly, and Rigging. Our students all solo and our course includes cross country training, formation flying, emergency landings. Flying instruction, $125.00. Airplane mechanics course of instruction, $100.00. *Write for full information.* Great Western School of Aviation, Box 138, Kansas City, Kansas.

Kentucky

Iseman Flying Field, Paducah, Ky. Learn to fly for $10.00 per lesson. No down payment. We guarantee complete instructions not to exceed $200.00. Course includes cross-country, aerobatics, meteorology, rigging, motor mechanics. No bond required for solo, Planes rented reasonable after solo. *Taxi and express service 35c per mile.* We use new Eaglerock and Travel Air planes.

WHERE TO FLY

Maryland

CHESAPEAKE AIRCRAFT CO.
LOGAN FIELD
Headquarters Armory, Baltimore
Air taxi service, mapping and photography and instruction.
DEALERS: Fairchild in Maryland. Travel Air in Maryland, Virginia, Delaware, District of Columbia.

Massachusetts

BOSTON AIRPORT CORPORATION
East Boston, Mass.
Divisions
Boston Airport Flying School, Boston Aerial Sightseeing Service, Boston & New England Air Taxi Service, Boston, Marthas Vineyard & Nantucket Airways.
STINSON DETROITER TRAVELAIR
Tel. East Boston 0362 *1873*

Massachusetts

Dennison Aircraft Corporation
10 Hour Air Instruction and 30 Hour Ground School — $250.00. Air instruction on modern steel tube ships. Ground instruction includes, Engines, Structure, Navigation, Aerodynamics, Meteorology. *Agents for* FAIRCHILD and WACO planes. Address:—
Dennison Airport, Atlantic, Mass.

Massachusetts

Old Colony Airways Corporation

Muller Field - Revere, Mass.
P.O. Box 285.
Eastern Mass. Dealers
Eaglerock and Ryan Brougham Planes

Student instruction under supervision of transport pilots in new Eaglerocks recognized as one of America's best training ships. Some choice dealer territory still open.

Missouri

ST. LOUIS AIRCRAFT COMPANY
Lambert St. Louis Flying Field
ANGLUM, MO.
Distributors American Eagle Airplanes
Flying instruction the year round. Primary flying course of 10 hours. Advanced flying course of 15 hours. Courses include all ground work and practical instruction in our shop. *Write for further particulars.*

Missouri

"The School of Superior Training"
KANSAS CITY FLYING SCHOOL INC.
—Master Instructors—New 1928 Ships—
10 HOUR COURSE $200—15 HOUR COURSE $275—50 HOUR COURSE $600
You pay only for the time actually in the air. Ground course and instruction is absolutely free to our flying students. This includes meteorology, navigation, motors, construction, rigging, trouble shooting. All work under Licensed Transport Pilots. Solo guaranteed in 10 hours. Advanced work, acrobatics, cross country, nite flying all after solo according to the course. You can pass the Departments flying and technical tests. You fly every day, no waiting for time, start the day you arrive. Write for full detail and outline of course.
KCFS
617 Grand Avenue, Kansas City, Missouri

Missouri

An Amazing Story of YOU in Aviation!

Read this wonderful book! Hundreds of others have shot up to fame and fortune in the world's most promising field — Aviation. Learn what you can do in a few short months. Be a flyer—not a piedder. LEARN TO FLY and learn Air Navigation, Meteorology, Aerodynamics, Airplane Construction and Maintenance, Motor Overhaul, Airport Management. Newest equipment used in any school. Travel Air, Waco, Eaglerock—Whirlwinds, Siemens, etc. A postcard with your name brings "Skyward Ho!" the full story of our training and your success, immediately—free! Write at once.

PARKS AIR COLLEGE
AFFILIATED WITH ST. LOUIS UNIVERSITY

204 Mo. Theatre Bldg. St. Louis Mo.

Missouri

Qualify for Private Pilot's License

15 hours flying or limited commercial license with 50 hours flying. Take examinations in training ship on training field. Officer stationed here. Richards Field oldest and best flying port. We train in newest and safest Eaglerock commercial planes. Licensed transport pilots (highest rating) instruct you. Thorough mechanical training. Send name for full details and personal complimentary pass entitling you to trip in Eaglerock airplane free.

Bennett Eaglerock Flying School
225 West 12th Street, Kansas City, Mo.

These Pages
Bring Advertisers
in Contact With
Prospects They Can Reach In
No Other Way
WRITE FOR RATES

Missouri

2 to 6 Weeks Course on New Equipment. This course covers sufficient primary training to enable each student to handle a ship by himself including solo flights, loops, spins, wingovers, side slips, fish-tailing, figure eights, stalls, emergency landings, and cross country flying by maps and compass. All instruction by transport pilots (highest government rating) on new production ships fully equipped with latest type instruments and controls. Students begin flying instruction the day they arrive in Kansas City. No unnecessary delays and expenses due to lack of equipment or instructors. Course can be completed in 2 to 6 weeks, depending upon weather conditions. Necessary texts, lectures and pilot's log book furnished free of charge. Complete course $250.00.
The Commercial Airways Corporation
205 East 22nd St., Kansas City, Mo.
Telephone — Grand 0956

Nebraska

LINCOLN SCHOOL OF AVIATION

Expert and complete instruction in flying, mechanics, meteorology, rigging, etc. $250 for ten hour ground and flying course. $600 for fifty hour course. We qualify you for U. S. Gov. license. No bond for solo. "Get your instruction where Lindbergh trained." *Write for literature.*
2419 SOUTH ST., LINCOLN, NEBR.

New Jersey

THE MILLER CORPORATION
10 hour flying and ground school course. Modern equipment. Experienced instructors. No liability bond required. *Write for details to* The Miller Corporation, New Brunswick Air Port, New Brunswick, N. J. Field two miles west of city on Lincoln Highway.

New Jersey

Warren County Aviation Co. Inc.
Agent for Waco Airplanes
For Warren, Hunderton, Sussex, Passaic counties in N. J. Northampton, Monroe counties in Penna. Student training on new Waco Airplanes. Rates and particulars on request. Phillipsburg, N. J. Phone 905.

New York

AVIATION ENGINEERING SCHOOL
Tel. Stillwell 6010.
Queensboro Plaza Sta., L.I.C., N.Y.
Engineering and practical training in designing, construction and flying; actual work in building new planes; also in repairing, testing all types of engines. Oldest and largest school in the state.

North Carolina

PITCAIRN AVIATION of NORTH CAROLINA, Inc.

10-HOUR FLYING COURSE, conducted at the Greensboro Municipal Airport, Friendship, N. C., a 4-way flying field operated by this Company. All-year-round school employing modern flying equipment including Pitcairn Orowings. No liability bond required.
Write for details.
Land Title Building
PHILADELPHIA

Ohio

Mansfield Aerial Service
MANSFIELD, OHIO
Student Training . . . Taxi Service
$20.00 an hour or $175.00 for 10 hr. course, including ground work, preparatory to private license. Write for full information.
Distributors of Lincoln-Page in Eastern Ohio

WHERE TO FLY

Ohio

Indian Lake Aviation Co., Russell Point, Ohio. Learn to fly at Ohio's most popular summer resort in new Eaglerock ships, competent instructors, reasonable quarters, and ideal flying conditions. Actual flying time $20. per hr. take as many hours as you need. Training begins the day you arrive. No bond for solo as no accidents have occurred in 8 years.

Ohio

HANGAR AND SERVICE CLEVELAND AIRPORT BOULEVARD—1011

GENERAL OFFICES 2196 CLARKWOOD RD RANDOLPH — 6765

TAC

CLEVELAND

PASSENGER SERVICE
STINSON AIRPLANE DISTRIBUTORS
HANGAR & REPAIR SERVICE

Also Aero-advertising and Photography—Sight-seeing Flights — Contract Work — Student Training, Stinson, Laird, Eaglerock, Swallow, Travel Air planes.

Thompson Aeronautical Corp.

Ohio

LEARN TO FLY

RAVENROCK AIRPORT,
PORTSMOUTH, OHIO

Where you will have the advantage of having competent instructors with long experience. Flying instruction under the supervision of 'Pat' Love veteran flier.

Up to date equipment of 'Waco' and 'American Moth' planes.

We guarantee to teach you to fly—giving you at least ten hours in the air. No liability bond required for when we turn you loose we know you can fly.

Complete course of flying and ground school $200.

After you have completed our course you can receive additional flying time through our club plan at a very nominal cost.

PORTSMOUTH AERO CORPORATION

Ohio

LEARN TO FLY IN CINCINNATI

Complete Flying Course in new Travel-Air Airplanes. . . . Expert instructors under direction of Major Hugh Watson. *Excellent lodgings near field. Write for complete details.*

WATSON AIRPORT, Inc., Blue Ash, O.
Exclusive Ohio Distributors for Travel-Air Planes.

Ohio

The Superior Aircraft Co.
(Dealers Alexander Eaglerock)

A thorough course in flying under competent instructors, on new Eaglerock planes. Course includes fundamental principles of Meteorology and Navigation. Information on request.

118 W. High St., Lima, Ohio.

New York

CURTISS FLYING SERVICE, Inc.
Clinton Road Garden City, N. Y.
In 1927 this Company flew more than 365,000 miles, carried 10,700 passengers, and graduated 224 flying students.
Air fleet of sixteen planes; equipment and personnel licensed by Department of Commerce. Phone Garden City 3508.
Write for Flying School Booklet.

Pennsylvania

PITCAIRN AVIATION of PENNSYLVANIA, Inc.

10-HOUR FLYING COURSE. 4-way flying field, at Willow Grove, Pa., the largest in the East, in midst of ideal flying country. All-year-round school. Modern flying equipment, including Pitcairn Orowings. Reasonable board and lodging near field. No liability bond required.

Write for illustrated booklet.

Land Title Building
PHILADELPHIA

Pennsylvania

COMPLETE TRAINING

Solo Practice — *Employment Service*

Course includes theory, mechanics and flying. Full or spare time training. Licensed instructors. Modern equipment. Qualify for any license. Low cost. Special facilities for out-of-town members. Write.

UNITED FLYING CLUB, INC.
1011 Chestnut St. Philadelphia, Pa.

Distributors LINCOLN PAGE AIRPLANE
Dealers wanted in Pennsylvania and N. J.

South Carolina

PITCAIRN AVIATION of SOUTH CAROLINA, Inc.

10-HOUR FLYING COURSE, conducted at the Spartanburg Municipal Airport, Spartanburg, S. C., 4-way flying field operated by this Company. All-year-round school employing modern flying equipment, including Pitcairn Orowings. No liability bond required.

Write for details.

Land Title Building
PHILADELPHIA

Texas

UNIVERSITY AERIAL SERVICE CO.
UNIVERSITY AIRPORT, Austin, Texas
State Distributors for

WACO AIRPLANES

NEW PLANES, PARTS, ACCESSORIES, OX-5 AND HISSO MOTORS CARRIED IN STOCK

Complete Service and Repair Facilities

AN ALL-YEAR-ROUND FLYING SCHOOL GRADUATING REAL COMMERCIAL PILOTS CONDUCTED by

University School of Aeronautics
Write us about your needs

Virginia

PITCAIRN AVIATION of VIRGINIA, Inc.

10-HOUR FLYING COURSE, conducted at Richmond's Municipal Airport, Fort Lee, Va.; a 4-way flying field operated by this Company. All-year-round school employing modern flying equipment including Pitcairn Orowings. No liability bond required.

Write for details.

Land Title Building
PHILADELPHIA

WHEN IN EUROPE TRAVEL BY AIR!

There's a record behind the British line to Europe and the East.

IMPERIAL AIRWAYS LTD.,
578, Madison Avenue, New York City or any travel agency.

C F H

A card in this directory keeps your service constantly before the industry. Through the Where to Fly pages schools come into weekly contact with prospects that can be reached in no other way.

WRITE FOR RATES

The Aircraft Service Directory

WHERE TO PROCURE EQUIPMENT AND SERVICES

See our Advertisement
Pages 984-985, April 16 Issue.
PIONEER INSTRUMENT COMPANY
754 LEXINGTON AVE. BROOKLYN NEW YORK

Big Harley twin motor 18 H.P. with propeller, $35.; 3 cyl. special radial motor 25 H.P., 98 lbs. $95.; Storms conversion, water cooled, 36 H.P. motor, slightly used, fine condition $100. Big twin Indian, perfect condition, 18 H.P. $45. Four cyl. magnetos, small radiators, propellers and hubs and oil pumps for Ford conversions at low prices. Motorcycle propellers $7., hubs $7.; 28 x 3 wheels with tires, tubes and bushings $25. pair. Good leather helmets (new) $1.50 Good 3 place fuselage $50., cracked Jennie upper wings (repairable) $30. per pair; good ailerons $6. pair. Send P.O. money order for prompt shipment.
STORMS AVIATION CO., ASHEVILLE, N. C.

THE EMBRY-RIDDLE COMPANY, Inc
LUNKEN AIRPORT, CINCINNATI, OHIO
WACO *Distributors* **WACO**
Complete Line of Supplies on Hand
OX5 Motor Parts Complete Line
ALL BRANCHES COMMERCIAL AVIATION
WE *GUARANTEE* TO TEACH YOU TO FLY

The Most Comfortable Safety Belt
Approved Type–Positive Lock–Instant Release
$5.00
AIR TRANSPORT EQUIPMENT, INC.
Carle Place, Long Island, N. Y.

SEND FOR RATES
FOR THE AIRCRAFT SERVICE DIRECTORY

MANUFACTURERS, WHOLESALERS, RETAILERS, ENGINEERS, DISTRIBUTORS USE THE AIRCRAFT SERVICE DIRECTORY

Daniel Guggenheim School of Aeronautics
Courses in Aeronautical Engineering and Industrial Aviation. For particulars apply to the Dean of the College of Engineering.
N. Y. University, University Heights, New York, N. Y.

Air Transport Engineering
Ask for Air Transport Leaflet
ARCHIBALD BLACK
Garden City, N. Y.

PHENIX NITRATE CLEAR DOPE
at $1.35 per gal. in 50 gal. steel drums. Drums extra at $7.00 and full refund if returned in 90 days, freight prepaid. $1.42 per gal. in 50 gal. Wood Barrels. $1.45 per gal. in 30 gal. Wood Barrels. $1.60 per gal. in 5 gal Boxed Cans.
WOOD BARRELS AND CANS INCLUDED AND NOT RETURNABLE.
Immediate shipment f. o. b. Factory.
All fresh made from new and high grade materials.
No war stock or reworked materials.
Phenix Aircraft Products Co., Williamsville, N. Y.

IF YOU HAVE SOMETHING THAT WILL INTEREST THE AERONAUTICAL INDUSTRY
THIS IS THE PLACE TO ADVERTISE
Lowest Rates

This Section Is Growing With Every Issue

INCORPORATE YOUR FLYING SCHOOL, CLUB OR BUSINESS IN DELAWARE
Liberal charters—reasonable rates
$100,000 corporation complete $73.00
500,000 " " 113.00
24 Hour Service.
LAWYERS CORPORATION COMPANY
Equitable Bldg., Wilmington, Del.

WATSON AIRPORT, INC., CINCINNATI, OHIO
Exclusive OHIO DISTRIBUTOR for
TRAVEL AIR
AIRPLANES
Major Hugh Watson, President and Chief Pilot. Flying Field, Watson Airport, Blue Ash, 12 miles from Cincinnati.
Learn to fly on a brand new Travel-Air

AIRCRAFT SUPPLIES
Recent additions to our stock of wide variety and large volume of standard and utility aircraft materials and motor parts now enables us to give you prompt and efficient service.
Send for 1927 Catalogue No. 5. Special quotations on quantity orders.
MONUMENTAL AIRCRAFT, INC.
339 N. St. Paul Terrace, Baltimore, Md.

The Aircraft Service Directory

WHERE TO PROCURE EQUIPMENT AND SERVICES

LUDINGTON PHILADELPHIA FLYING SERVICE
Incorporated
OPERATORS PHILADELPHIA AIRPORT
PASCHAL P. O., PHILADELPHIA, PA.
FAIRCHILD *Agents* WACO
Modern Flying Instruction Course Aerial Taxi Service
Field Completely Equipped for Day and Night Flying.
Machine and Woodworking Shops, Supplies and Modern Hangars
CITY OFFICE, ATLANTIC BLDG., PHILADELPHIA, PA.

Actual Size
SEND ONE DOLLAR
We will send you by return mail a beautiful pair of sterling silver wings mounted on bar pin with safety catch, also identification card issued by National Flyers Ass'n. These pins are being worn by thousands of aviators, aviation mechanics and boosters.
WALLACE AERO CO., Bettendorf, Iowa

AVIATION
$4.00 a year — Canada $5.00
Foreign $6.00

DIRECTORY ADS BRING RESULTS
Ask Our Advertisers

WACO AIRPLANES
NEW YORK AIRCRAFT DISTRIBUTORS, INC.
New York Distributors
CURTISS FIELD, GARDEN CITY, N. Y.
GARDEN CITY 4360

STEARMAN—STINSON MONOCOUPE
GEO. A. WIES, Inc.
Hangar *12 Juniper Ave.*
Curtiss Field. *Mineola, N. Y.*

South America
COLOMBIAN AIRWAY SYSTEM
Saves 10 days from Seaports to Central and Western Colombia
Air Mail, Parcelpost and Passengers on scheduled service connecting with United Fruit Steamers.
For particulars inquire:
American Trading Co., Inc., 25 Broad St., New York City

Airplane Business for Sale
All planes, hangars, tools, equipment and assets of Yackey Aircraft Co., Maywood, Illinois.

EVERYTHING FOR THE AIRPLANE
LARGEST AIRPLANE SUPPLY HOUSE IN THE WEST
A complete line of parts and accessories for aircraft at lowest prices
A money-back guarantee on everything sold.
WRITE OR WIRE US YOUR REQUIREMENTS.
CRAWFORD AIRPLANE COMPANY
"Masters of the Air."
150 WASHINGTON BLVD. VENICE, CALIFORNIA

Place Your Product Before the Industry by Advertising in The Directory

CONSULTING ENGINEERS
Airports - Airways - Aircraft
SURVEY - CONSTRUCTION - EQUIPMENT - OPERATION
AERONAUTICAL ENGINEERING CO.
527 5th Avenue, New York — Murray Hill 4955

AEROTECH Inc.
Aeronautical Engineering Design,
Stress Analysis, Reports, Appraisals.
Complete Testing Facilities
1955 Sedgwick Ave., New York City *Moline, Ill.*

Eastern Distributors
LOCKHEED "VEGA"
Hangar: Curtiss Field, Long Island, N. Y.
City Office: 535 Fifth Ave., New York City
AIR ASSOCIATES, Inc.

Advertise in this Section
Watch the Results!

Aircraft Service Directory

ALL METAL EDO SEAPLANE FLOATS
AIRCRAFT CORPORATION
COLLEGE POINT, L. I., N. Y.

HARTZELL
Contractors to U. S. Government and Commercial Manufacturers
HARTZELL PROPELLERS ARE RELIABLE
BUILT ON HONOR — THEY ARE GIVING EFFICIENT SERVICE ON ALL CLASSES OF MILITARY AND COMMERCIAL AIRPLANES
New OX Walnut Propellers for Quick Shipment
HARTZELL WALNUT PROPELLER CO.
PIQUA, OHIO

HASKELITE
PLYWOOD
Used by every important builder. Recognized as the standard plywood for airplane construction. Over 30 applications. Blue print data book on request.
HASKELITE MANUFACTURING CORPORATION
120 S. LaSalle Street, Chicago, Illinois

Advertise in a magazine where you will get RESULTS. That's AVIATION!

NEW OX5 TRAVEL AIRS
Due to the fact that we bought a quantity of new OX5 engines early in 1927 we are still in a position to supply a number of these airplanes. No motors for sale alone.
RUSH YOUR ORDERS.
Roth-Downs Airways — 2512 University — St. Paul, Minn.

LIBERTY MOTORS For Export & Domestic Use. For Airplanes & Boats. LIBERTY PARTS
THE VIMALERT COMPANY, Ltd.
807 Garfield Avenue Jersey City, N. J., U. S. A.

CLASSIFIED AND DIRECTORY ADVERTISEMENTS MEAN RESULTS

AERONAUTIC SAFETY CODE

A Compendium of the Results of Four Years' Study by Leading Engineers, and Government and Civilian Experts of the Aircraft Industry

Sponsored by the U. S. Bureau of Standards and Society of Automotive Engineers, and Approved by the American Engineering Standards Committee, October, 1925.

The Aeronautic Safety Code covers

GOOD PRACTICE AND SAFE METHODS in the Design, Construction, Testing, Operation and Maintenance of Aircraft, Aircraft Engines and Accessories, Airdrome and Airway Equipment

It includes

SENSIBLE RULES OF THE ROAD AND SAFETY PROVISIONS FOR FLYING AND GROUND PERSONNEL

Fifty-two Pages - Well Indexed

AN ESSENTIAL REFERENCE GUIDE FOR THOSE WHO WISH TO BUILD UP PUBLIC CONFIDENCE IN AIR TRANSPORT.

SINGLE COPIES $1.50

A year's subscription to AVIATION (52 issues, $4.00) and a copy of the Safety Code for $5.00.

AVIATION PUBLISHING CORP.
250 W 57 St., New York

Use the Coupon

AVIATION PUBLISHING CORP.
250 W 57 St.,
New York.

Check (X) in Square

☐ Enter my subscription to AVIATION and mail me a copy of the AERONAUTIC SAFETY Code. Five dollars to cover is enclosed.

☐ Mail to address below — copy or copies of the AERONAUTIC SAFETY CODE, AT $1.50 each, for which I enclose $

(Name) .....

(Address) .....

CLASSIFIED ADVERTISING

10 cents a word, minimum charge $2.50, payable in advance. 15 cents a word if box number is used.
Address replies to box numbers, care AVIATION, 250 W. 57th St., New York.

FOR SALE

IMMEDIATE SALE: Nieuport biplane, wings, tail group, fittings complete. New Gnome 165 hp., complete motor, tachometer, prop., instruments. Entire lot crated $200.00. Loyd Pepple, Queensborough, Shreveport, La.

ATTENTION AVIATORS: Graphite valve guides threaded into OX and OXX cylinders. Removable valve seats installed. Graphite piston rings. Prices and descriptive literature upon request. Ill. Flying Co., 507 Locust St., Sterling, Ill.

TWO OVERHAULED C-6 motors with Bijur starters and new spare parts for $750.00 each. New Orleans Air Line, New Orleans, La.

FOR SALE: Hisso motor, 180 hp., like new; all kinds spare parts, $650.00. A. Ghio, P.O. Box 1205, San Diego, Calif.

HAVE 14 OX-5's same as new. All can be used in new ships. Closest inspection invited. $8,000.00 for all or $600.00 separately. Huge complete stock OX-5 parts, Hisso parts. Hewes Motor Co., Waukegan, Ill.

LONG WING Eaglerock, split type landing gear, motor and ship in perfect condition, had less than 100 hours time, $2200.00. Wire Paul Braniff, Braniff Bldg., Oklahoma City, Okla.

FOR SALE: Licensed Waco Nine OX-5 dual controls, Hartzell propeller; motor and ship in excellent condition; many extra features; $1750. Harold Kindred, 731 East Broadway, Enid, Okla.

NEW PRODUCTION combination Eaglerock parts; fuselage with damaged second bay from stern, minus motor mount; two upper wings, one good, other slightly damaged; ailerons repairable; new OX-5 motor, Miller valve actions, slightly damaged; landing gear with tires minus wheels and axles. Sell all or part cheap. Box 487, Lumberton, N. C.

FOR SALE: 50 new Mosler spark plugs, list $2.00. 650 new A C spark plugs, list 40c. Take $180.00. Box 870, AVIATION.

FOR SALE: New OX-5 motor, $650.00. New Waco 10, $2650.00. One Waco 9, government license, excellent condition, $1700.00. Lu-The Flying Services, Inc., Jackson, Mich.

FOR SALE: Swallow and Travel Air, excellent condition, kept in hangar with or without motors, priced fair considering condition and service value. E. C. Nilson, Orlando, Fla.

FOR SALE: 4 place cabin monoplane, suitable for 100 hp. motor. Has been tested with 80 LeRhone. Bargain. Frank McCullough, 5605 Tireman Ave., Detroit, Mich.

FOR SALE: Eaglerock airplane, OX-5 motor, practically new. Has dual controls and Miller valve action. Price $2200.00. Fred Johnson, 103-14 94th St., Ozone Park, L. I., N. Y.

FOR SALE: Swallow, dual control, good condition, spare OX-5 motor, nearly new. Ship never used for passenger service or barnstorming. Justin P. Fleming, Jackson, Mich.

WOODSON FIVE-place, dual control, radial motored. Real performance with five people. Thousand pound pay load. $2500.00 for quick sale. Big money-maker on account of its large carrying capacity. Corliss Creamery Co., 1760 West Carson St., West End, Pittsburgh, Pa.

FOR SALE: Pitcairn Orowing ship with steel tail section. Spare motor and spare parts; all in first-class condition. Riverside Garage Co., Pottstown, Pa.

FOR SALE: 15 hour flying course. Will sell cheap. Air mail field in Illinois. Reliable school and instructors. Modern ships. Must sell at once. Edward Lorence, 121 E. 5th St., Connersville, Ind.

FOR SALE: Henderson de Luxe engines direct converted $75.00 to $250.00. Geared conversion—price on request. Michael Tortolini, 21 High Rock St., Lynn, Mass.

FOR SALE: Ryan M-1 converted 220 Hisso motored, two passengers and pilot, like new. Only 18 months old. Kept in hangar. 5 hours cruising range. New Hamilton propeller. For quick sale $2900.00. M. A. Caffarello, 460 N. Halsted St., Chicago, Ill.

FOR SALE: Heath sport plane equipped with Henderson engine. Both in excellent condition with less than ten hours. Cheap. T. A. B., 3530 Ave. S, Galveston, Texas.

FOR SALE: Nicholas-Beazley commercial Standard with OX-5. Also OXX-6 motor. All in first class shape. All for $1250.00. Clarence Owensby, Jr., 611 Rogers, Fort Smith, Ark.

STANDARD TOURSTER with 150 Hisso model A motor. Wing and tail surfaces newly recovered. Motor completely overhauled. A real bargain at $1400. If interested wire Air Service, Inc., 2600 Delaware Ave., Minneapolis, Minn.

EQUIPMENT WANTED

WANTED: CURTISS Jenny or Canuck; must be bargain or some other cheap plane, preferably near New York. Give full particulars including price and terms. Box 868, AVIATION.

WANTED 5c each for your old intake rocker arm H's, if not cracked or bushed; 10c each for inlet water pipes if 4 pack nuts are OK. Will give rebuilt complete valve action exchange your old ones at $4.50 each. Hewes Motor Co., Waukegan, Ill.

WANTED: Used OX-5 motors or parts. Also OX-5 crank cases and OXX-6 crank cases. Box 782, AVIATION.

WANTED: TWO OX Travel Airs or similar ships, also two War production ships single seater or more. Give best cash price. Ships must be airworthy and priced to sell. Dixie Davis Flying Field, 3739 Pennsylvania Ave., Cincinnati, O.

WANTED: TWO place ship; must be in good condition and a bargain. Give price and particulars in first letter. C. H. Willis, Center, Colo.

WANTED: NEW or used 220 Hisso priced right. New or used underslung cross-flow radiator for 180 hp. Hisso. Address Raymond Kinney, 173 Forest Ave., Fond du Lac, Wis.

WANTED: 165 hp. Gnomes or 120 hp. LeRhones. Will buy 50 motors. Must be in perfect condition. Complete and price low. Walter G. May, 160 Vernier Rd., Grosse Pointe Shores, Mich.

WANTED: CRACKED up Waco tens, any condition, with or without motor: must be licensed. State lowest cash price. Rummell Air Service, Ltd., Findlay, Ohio.

WANTED: WACO 9 or 10; will trade Packard straight eight Phaeton in absolute perfect and new condition. Will pay cash difference. Write. Edwin J. Liska, 5301 W. 30th St., Cicero, Ill.

WANTED: AT once! Used OX-5 and OXX-6 motors. Need not be complete. Please give full particulars and price. City Battery Service, 168 Valencia St., San Francisco, Calif.

WANTED: THREE new 220 Hissos. D. L. Chick, 20 East Dartmouth Road, Kansas City, Mo.

POSITIONS WANTED

PILOT WITH experience as airport manager desires position with reliable party. Good record and excellent references. Box 869, AVIATION.

HELP WANTED

PILOT WANTED: OX-5 three-place ship. Short joy hops. Steady position for right man. Salary or percentage. Eagle Aviation Service, 111 Loomis St., Nanticoke, Pa.

WANTED: TWO transport pilots; state age, married or single; give commercial experience, especially instructing. Fine opportunity right parties. Orlando Airlines, Inc., Orlando, Fla.

WANTED: EXPERIENCED instructor now unlicensed, who can qualify for license upon delivery of licensed planes later. Standard planes and Ohio location. Experience, hours, photo and salary desired in first letter. Box 867, AVIATION.

WANTED: TWO pilots who can qualify, able to give references and keep ships in repair. Teaching and passenger flying. Good opportunity. No curiosity seekers wanted. York Airways, York, Pa.

CLASSIFIED ADVERTISING

10 CENTS A WORD, MINIMUM CHARGE $1.50

MISCELLANEOUS CLASSIFIED ADVERTISING

JUST OUT—Book and blue prints on design, construction and operation of small sport plane. Contains lessons in flying also. All for $1.00 postpaid. Chas. E. Russell, 545 Stadium Place, Ft. Wayne, Ind.

ATTENTION PLANE manufacturers. I have a modern Pease continuous blue printing machine to trade on OX light biplane. C. B. Malcolm, Roanoke, Va.

CAN PLACE reliable pilot and 3 place ship (dual preferred) on established field near New York. Box 865, AVIATION.

MANUFACTURER WITH capital, woodworking facilities and force of skilled labor, will devote at least a portion of his factory to the manufacture of airplane framework or parts. Pleased to communicate with airplane manufacturers fathering ideas for further expansion by the jobbing of parts, or with individuals having good design for new model planes, practical inventions for parts, or specialty articles of marketable value who need backing and encouragement. G. L. Kesler, 335 Reynolds St., Rockford, Ill.

ROLLS ROYCE sport model, English chassis, Brooks body, trade for cabin plane. Write Room 717, Fisk Bldg., New York, N. Y.

WILL TRADE 26 Pontiac coach, first class shape and have some cash for good OX-5 ship. What have you? C. H. Inmann, 409 N. Iuka St., Pratt, Kans.

WISH TO hear from licensed pilot. Have partnership proposition to purchase commercial plane. Near New York City. Particulars on request. Personal interview granted. R. Sosa, 26 Atlantic Ave., Lynbrook, L. I., N. Y.

WHEN YOU WANT to buy, sell or exchange planes, motors and accessories—or are in need of competent help, or seeking a responsible position AVIATION Classified or "Directory" ads will prove advantageous. AVIATION, as the only weekly, covers your entire field first.

INDEX TO ADVERTISERS

Advance Aircraft Co. ... 1225
Aero Supply Co. ... 1266
Aeronautical Eng. Co. ... 1273
Aerotech, Inc. ... 1273
Air Associates, Inc. ... 1273
Air Transport Equipment, Inc. ... 1272
Aircraft Devices Corp. ... 1264
Aircraft Service Directory ... 1272-1273-1274
Airplane Sales & Service Corp ... 1259
Alexander Aircraft Co. ... 1190
American Eagle Aircraft ... 1254
American School of Aviation ... 1268
American Trading Co., Inc. ... 1273
Arthur, Wm. E. & Co. ... 1263
Austin, Co., The ... 1215
Aviation Institute of U. S. A. ... 1247
B. B. T. Corp. of America ... 1192
B. G. Corp., The ... 1253
Barber & Baldwin, Inc. ... 1237
Belden Manufacturing Co. ... 1255
Bendix Brake Co. ... 1253
Black, Archibald ... 1272
Boston Auto Gage Co., The ... 1257
Bowser & Co., Inc., S. F. ... 1217
Braniff Co., The T. E. ... 1261
Brownback Motor Laboratories, Inc. ... 1266
Buhl Aircraft Co. ... 1235
Classified Advertising ... 1275-1276
Cleveland Pneumatic Tool Co. ... 1252
Consolidated Instrument Co. ... 1267
Crawford Airplane Co. ... 1273
Curtiss Aeroplane & Motor Co. ... 1267
Deslauriers Column Mould Co. ... 1248
Dolphin Paint and Varnish Co., The ... 1249
Eagle Airport School of Aviation ... 1236
Edo Aircraft Co. ... 1274
Embry-Riddle Co., Inc., The ... 1272
Erickson ... 1256
Fairchild Aviation Corp. and Subsidiaries ... 1191
Goodyear Tire & Rubber Co. ... 1198
Guggenheim School of Aeronautics, Daniel ... 1272
Hall Aluminum Aircraft Corp. ... 1255
Hamilton Metalplane Co. ... 1219
Hartzell Walnut Propeller Co. ... 1265-1274
Haskelite Mfg. Co. ... 1274
Holcker Manufacturing Co. ... 1258
Ihling Bros. Everard Co. ... 1264
International Life Saving Water Making Cup Corp. ... 1277
Ireland Aircraft Co. ... 1254
Johnson Airplane & Supply Co. ... 1250
Kendall Refining Co. ... 1199
Kinner Manufacturing Co. ... 1238
Kreider-Reisner Aircraft Co., Inc. ... 1258
Kucher, A. A. ... 1262
Laird Aircraft Corp. ... 1195
Lawyers Corporation Co. ... 1272
Lee Mercantile Co., H. D. ... 1201
Lenert Aircraft Co. ... 1246
Loening Aeronautical Engineering Corp. ... 1196-1197
Ludington Philadelphia Flying Serv. ... 1239-1273
Marshall Flying School ... 1262
Monumental Aircraft, Inc. ... 1229-1272
National Aeronautic Association ... 1268
New York Aircraft Distributors, Inc. ... 1273
Nicholas-Beazley Airplane Co., Inc. ... 1259
Odenbreit, Inc., Frank L. ... 1241
Pacer Aircraft Corp. ... 1231
Paxton Lumber Co., Frank ... 1261
Perry-Austen Mfg. Co. ... 1264
Phenix Nitrate Clear Dope ... 1272
Pioneer Instrument Co. ... 1272-1280
Pitcairn Aviation, Inc. ... 1227
Pratt & Whitney Aircraft Co. ... 1279
Remington-Burnelli Aircraft Corp. ... 1245
Roth Downs Airways, Inc. ... 1274
Ryan Aeronautical Corp. ... 1244
San Diego, City of ... 1258
Scintilla Magneto Co. ... 1203
Scully Bros., Inc. ... 1251
Service Steel Co. ... 1268
Shaw, Inc., B. Russell ... 1257
Simplex Aircraft Corp. ... 1193
Southern Airways, Inc. ... 1251
Southland Jobbing House ... 1265
Standard Oil Co. ... 1200
Stearman Aircraft Co., The ... 1242
Stefco Steel Co. ... 1233
Storms Aviation Co. ... 1273
Stumpp & Walter Co. ... 1261
Summerill Tubing Co. ... 1265
Swallow Airplane Mfg. Co. ... 1252
Teitzel-Jones-Dehner Boot Co., Inc., The ... 1267
Texas Pacific Coal & Oil Co. ... 1194
Thomas Investment Co. ... 1259
Titanine, Inc. ... 1268
Travel Air Mfg. Co. ... 1223
Truscon Steel Co. ... 1243
Van Schaack Bros. Chemical Works, Inc. ... 1263
Varney Air Lines ... 1256
Velie Motors Corp. ... 1221
Vimalert Co., Ltd. ... 1274
Vought Corp., Chance ... 1202
Wallace Aero Co. ... 1273
Watson Airport, Inc. ... 1272
Whaley & Co., Edward A. ... 1263
Where to Fly ... 1269-1270-1271
Wies, Inc., Geo. A. ... 1273
Wright Aeronautical Corp. ... 1204
Yackey Aircraft Co. ... 1273
Yancey, Capt. Lewis A. ... 1240

Keeping Pace . . . with an Industry that Flies

KEEPING pace with an industry that flies is impossible without a means of obtaining reliable and timely news of events in the industry—complete authoritative information on technical developments, new planes, engines and equipment—facts about modern production methods, merchandising procedure, operating practice, etc., as well as accounts of other aeronautical developments of importance. A good aeronautical publication should be the means for obtaining the above.

AVIATION is a weekly magazine which was originally established in 1916 and which since that date has been devoted entirely to the advancement of civil, commercial, and military aeronautics. Instead of stressing the romantic and spectacular in flying, AVIATION has always endeavored to print authentic, instructive and timely information so that its readers, which for the most part are those directly engaged in the industry, may keep themselves well informed on developments in that field. AVIATION is edited by experienced fliers who also possess a knowledge of publication practice and business in general. Each department is in charge of a man well qualified in his particular line. AVIATION has a larger editorial staff than any other aeronautical magazine and in addition spends more in payment for feature articles than any other publication, as expense is not spared in gathering editorial material. The advantage of weekly issues in a rapidly moving industry is self-evident.

News

AVIATION as a weekly can present news while it *is* news. A nation-wide organization gathers information which is checked and edited by a special news editor. AVIATION news is reliable and complete. It gives the aviation slant to national news events. A whole section is devoted to the local news of the leading airports.

Technical Articles

IMPORTANT technical articles are contributed by prominent authorities or are written by a technical editor, who is a graduate of a leading aeronautical engineering school. Material is gathered from many sources, both foreign and domestic, and covers the latest developments in aerodynamics, aircraft structures, airplane and engine design, navigation, meteorology, night flying, etc.

AVIATION is in a most favorable position to procure valuable technical articles because of the intimate contact it has had with the entire field of aeronautics during twelve years of continuous publication.

New Planes, Engines and Equipment

DETAILED and reliable information on new planes, engines, accessories, and equipment is published in AVIATION weekly. It is possible to describe practically every new product in detail, because AVIATION carries during the course of a month as much editorial material as the three largest monthly aeronautical publications combined.

Statistics and Specifications

AVIATION was the pioneer in the gathering and publishing of statistics on the aeronautical industry. It leads in this field at the present time and publishes much valuable statistical data, including figures on aircraft and engine production, exports, etc. Most of this is original material collected by the organization.

A table of specifications on American commercial airplanes and seaplanes is published in the first issue of each month. It presents, in easily comparable form, dimensions, performance data, constructional information, equipment, etc. A similar table for American aircraft engines is published once each month.

Production Methods, Merchandising and Operation

AVIATION specializes in articles which will help those professionally engaged in aeronautics to produce more efficiently, market more successfully, or operate more economically, as the case may be. It is the business paper of the aeronautical industry. Articles are published regularly on improved production methods and practices; on the merchandising of aircraft, engines, accessories and the selling of commercial aviation services; and on the various phases of operation, such as airlines, commercial aviation service, schools and airports.

Departments

THE EDITORIAL pages of AVIATION carry constructive discussions and views that result from an intimate contact with and thorough understanding of the problems of the aeronautical industry. Other departments are: *Foreign Aeronautical News, Book Reviews, Airports and Airways.* In this latter department there is included local airport news, lists of planes sold by local dealers, students enrolled by flying schools, etc. There is also a section devoted to news of the U. S. Air Services. Last but not least comes Robert R. Osborn's *Side Slips* column with its inimitable comments.

Buyers Service

(*Advertising*)

THE ADVERTISING pages of AVIATION are a valuable and interesting source of aeronautical information. In these pages the leaders of the aeronautical industry describe their products and announce their latest developments. If you are contemplating taking a flight, learning to fly, purchasing a plane or any sort of aeronautical material, you will find the advertising pages of AVIATION invaluable.

IF YOU can use complete and authoritative information about what is going on in the aeronautical industry to advantage (and who cannot profitably use more knowledge about their particular line of work) you will be interested in receiving AVIATION regularly. At twenty cents a copy the 52 issues published during a year cost more than $10.00 and you run the risk of missing quite a few issues. However, a subscription for a year (52 numbers) costs only $4.00. The coupon below is for your convenience.

AVIATION

Oldest American Aeronautical Magazine

AVIATION PUBLISHING CORPORATION
250 WEST 57TH STREET, NEW YORK CITY

Please send me AVIATION for one year (52 issues), starting with the earliest possible issue. Subscription price: one year, $4.00 (Canada, $5.00; Foreign, $6.00). Check (or money order) is enclosed.

Name .....

Address .....

.....

Nature of your work .....

Classification of readers by occupation desired

ARMBRUST LIFE SAVING WATER MAKING CUP

THE Armbrust Life Saving Water Making Cup is a humane device, the primary object of which is to furnish pure drinkable water in the event of emergency or when no other pure water is available.

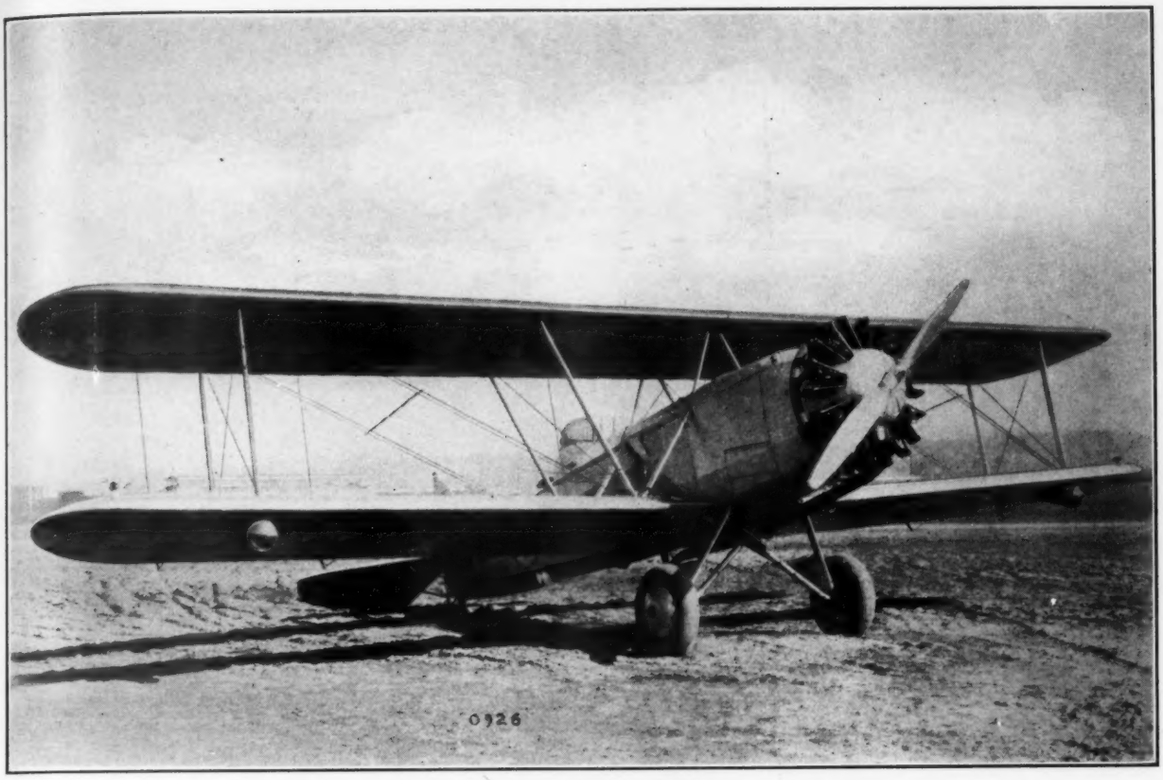
The following pilots carried Armbrust Cups on their famous flights

Colonel Charles A. Lindbergh...New York to Paris Flight..."*Spirit of St. Louis*"
Commander Richard E Byrd...of North Pole Fame..."*Josephine Ford*"
Commander Richard E. Byrd...New York to Paris Flight..."*America*"
Captain Rene Fonck...New York to Paris Flight...Ill fated "S-35"
Ernest Smith and
Emory B. Bronte...Oakland to Honolulu Flight..."*City of Oakland*"
Jack Frost and
Gordon Scott...San Francisco to Honolulu Flight..."*Golden Eagle*"
Major L. Irving...San Francisco to Honolulu Flight..."*Pabco Flyer*"
C. W. Parkhurst and
Ralph C. Lowes, Jr....San Francisco to Honolulu Flight..."*City of Peoria*"
Lloyd W. Bertaud and
James DeWitt Hill...New York to Rome Flight..."*Old Glory*"
Eddie Stinson...Winner Ford Trophy Derby..."*Miss Wayco*"
William Brock and
Edward F. Schlee...Flight around the World..."*Pride of Detroit*"
"Duke" Schiller and
Phil. Wood...Windsor, Canada to Windsor, England..."*Royal Windsor*"
Paul R. Redfern...Brunswick, Ga. to Rio Janeiro..."*Port of Brunswick*"
Ruth Elder and
Captain George Haldeman...New York to Paris Flight..."*American Girl*"
United States Navy...Navy Planes
U. S. Naval Officials Personnel...include such prominent aviators as the Late Commander John Rodgers, of California to Hawaii fame, and the Late Commander Noel Davis; both of whom highly endorsed this device and always had them in their planes.
Also purchased by John Wanamaker, New York ...Sport Goods Section

THIS DEVICE IS INDISPENSABLE LIFE SAVING EQUIPMENT
for all types of vessels, troops, mines, people in desert places and aviators in hazardous flights.

For further particulars write

INTERNATIONAL LIFE SAVING WATER MAKING CUP CORP.
204 Woodward Building, Washington, D. C.



Boeing Air Mail Plane equipped with 500 H.P. P. & W. "Hornet".

The Big Brother Carries On

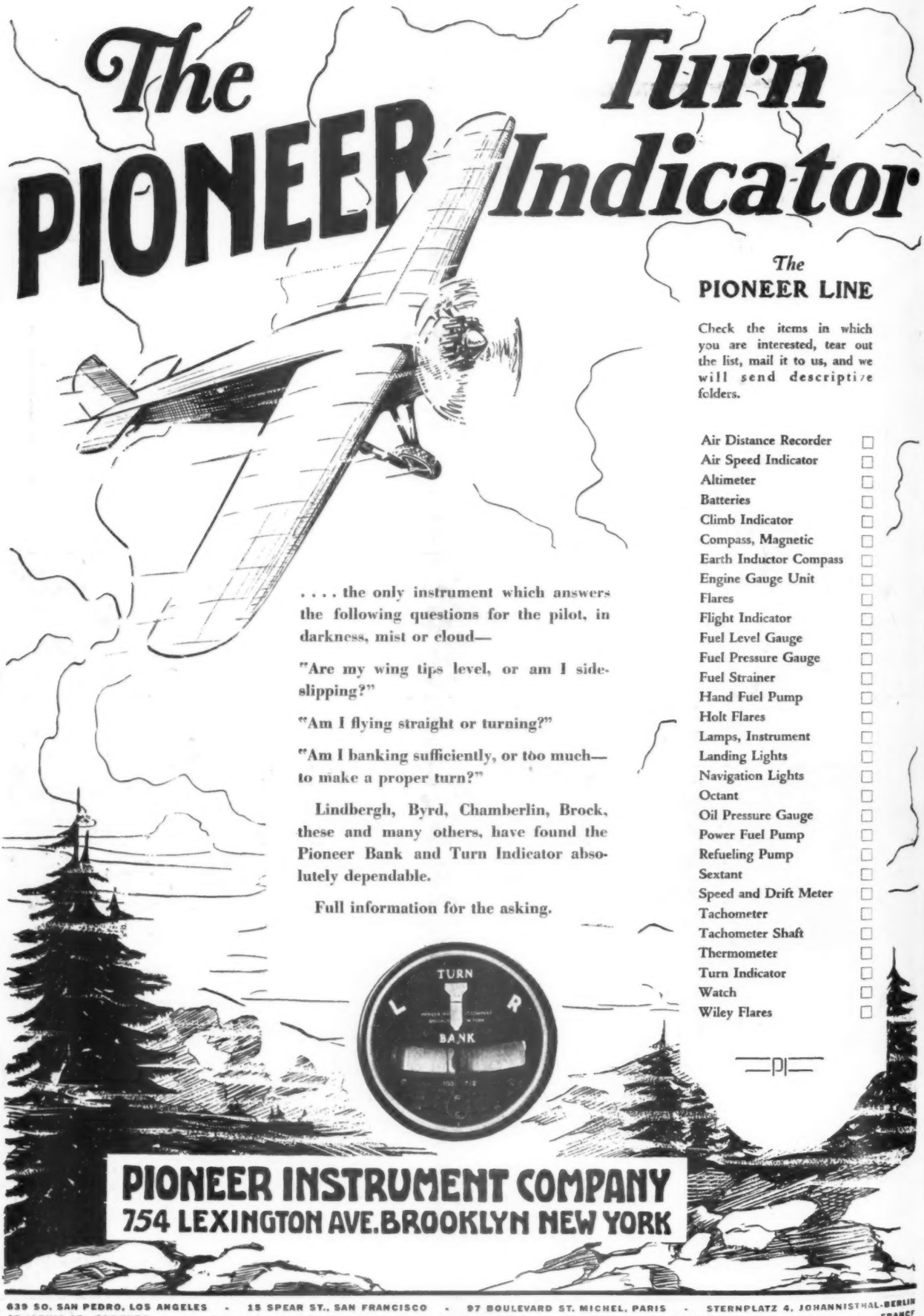
DUE to the steady increase in mail loads over the Boeing line, the 500 h.p. "Hornet" is replacing the smaller "Wasp" for operations over the high mountains of the Western Division of the Transcontinental route. Sixteen "Hornet" equipped mail ships will shortly be in use, the first of these having already flown several hundred hours.

The "Wasp" has established an enviable commercial record in flying more than a million miles to date in Air Mail Service alone. The "Hornet" is identical in design, and is giving the same splendid performance.

THE
PRATT & WHITNEY AIRCRAFT CO.
HARTFORD CONNECTICUT

DEPENDABLE ENGINES

The PIONEER Turn Indicator



. . . . the only instrument which answers the following questions for the pilot, in darkness, mist or cloud—

"Are my wing tips level, or am I side-slipping?"

"Am I flying straight or turning?"

"Am I banking sufficiently, or too much—to make a proper turn?"

Lindbergh, Byrd, Chamberlin, Brock, these and many others, have found the Pioneer Bank and Turn Indicator absolutely dependable.

Full information for the asking.

The PIONEER LINE

Check the items in which you are interested, tear out the list, mail it to us, and we will send descriptive folders.

Air Distance Recorder	☐
Air Speed Indicator	☐
Altimeter	☐
Batteries	☐
Climb Indicator	☐
Compass, Magnetic	☐
Earth Inductor Compass	☐
Engine Gauge Unit	☐
Flares	☐
Flight Indicator	☐
Fuel Level Gauge	☐
Fuel Pressure Gauge	☐
Fuel Strainer	☐
Hand Fuel Pump	☐
Holt Flares	☐
Lamps, Instrument	☐
Landing Lights	☐
Navigation Lights	☐
Octant	☐
Oil Pressure Gauge	☐
Power Fuel Pump	☐
Refueling Pump	☐
Sextant	☐
Speed and Drift Meter	☐
Tachometer	☐
Tachometer Shaft	☐
Thermometer	☐
Turn Indicator	☐
Watch	☐
Wiley Flares	☐

PIONEER INSTRUMENT COMPANY
754 LEXINGTON AVE. BROOKLYN NEW YORK

639 SO. SAN PEDRO, LOS ANGELES · 15 SPEAR ST., SAN FRANCISCO · 97 BOULEVARD ST. MICHEL, PARIS · STERNPLATZ 4, JOHANNISTHAL-BERLIN
45 JARVIS ST., TORONTO · · *General European Representative* · · M. CALDERARA · · 11 BIS RUE MONTAIGNE · · PARIS · · FRANCE